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EVERY THURSDAY

No. 1381  
Vol. XXVII

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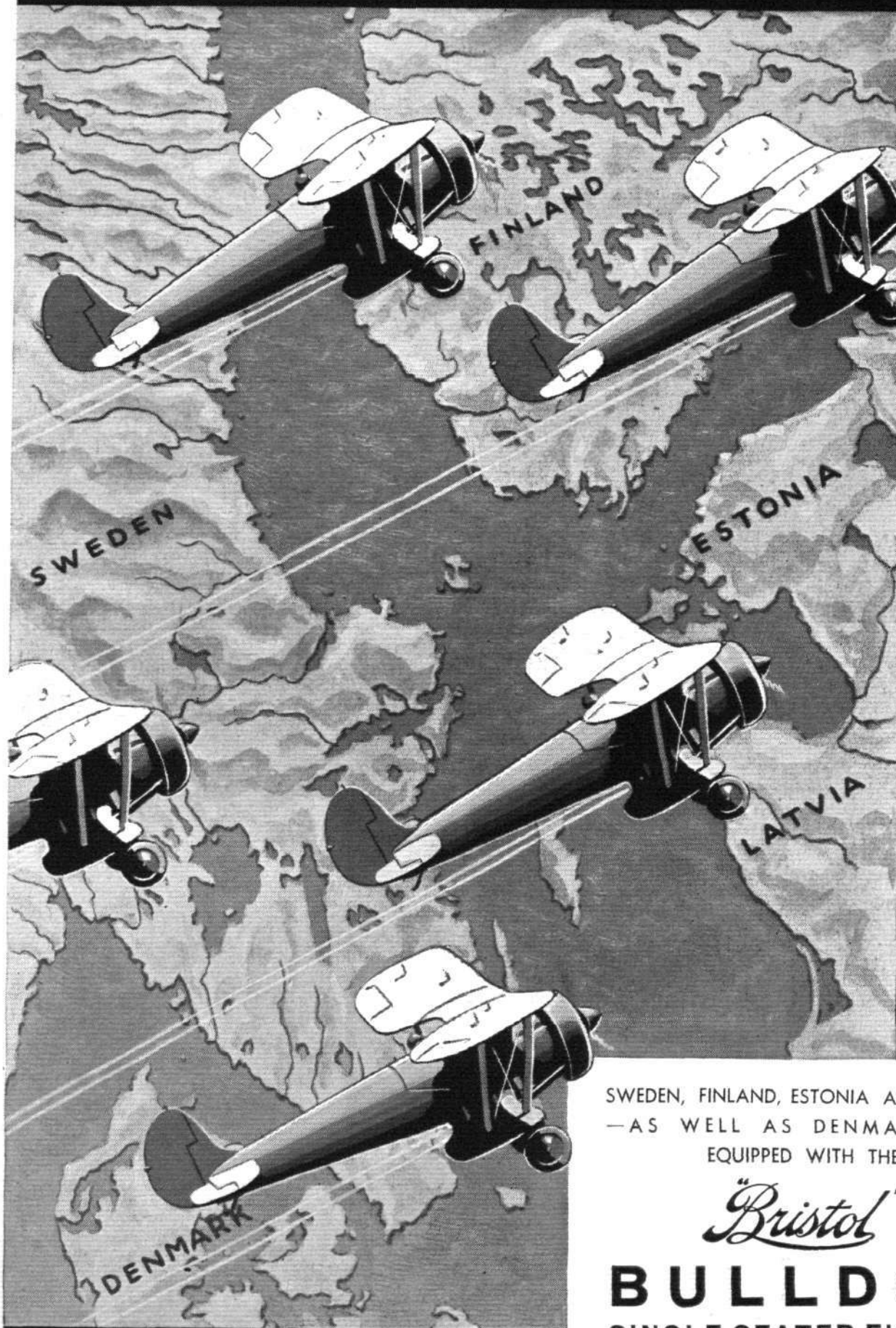
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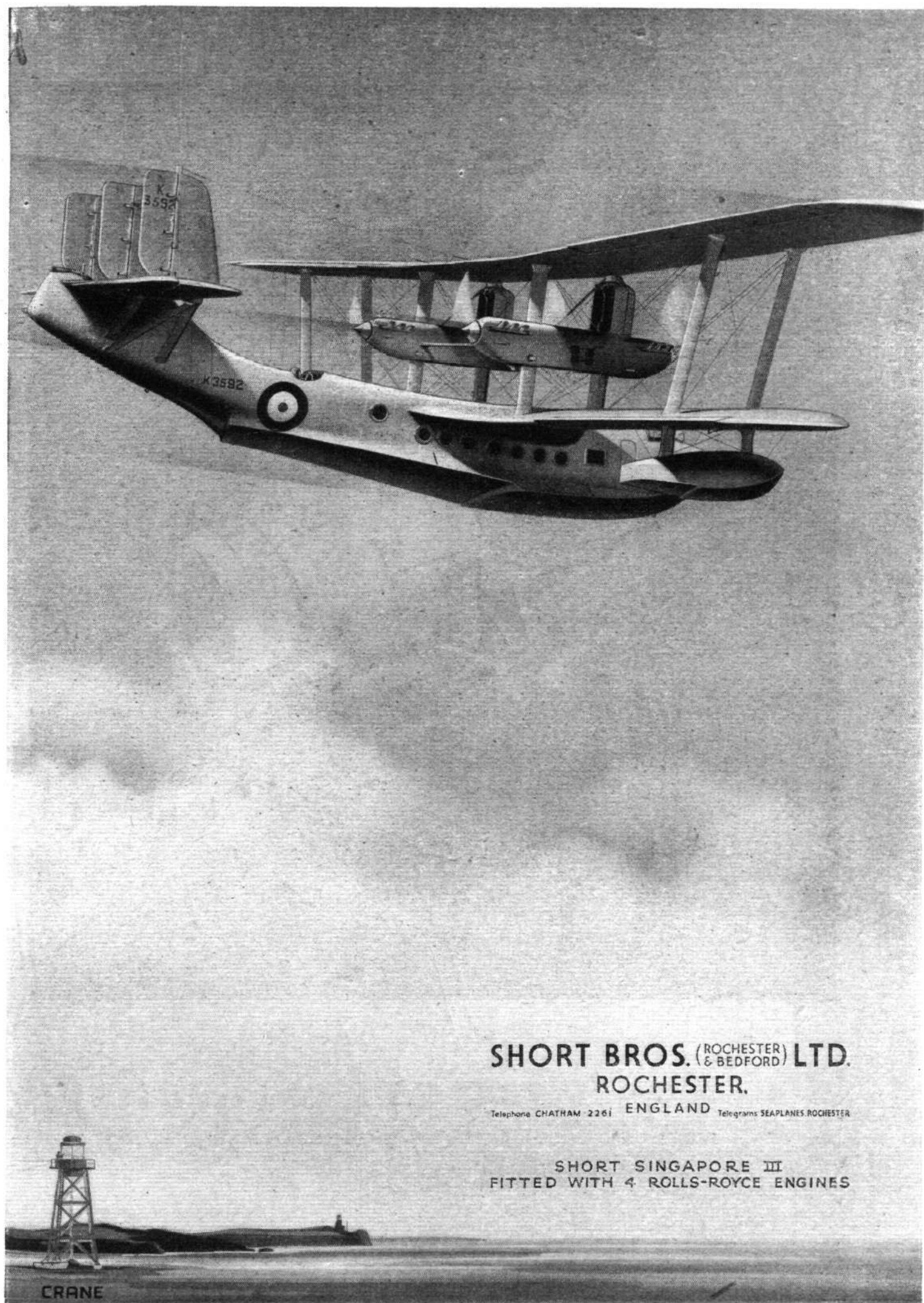
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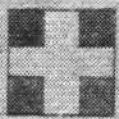
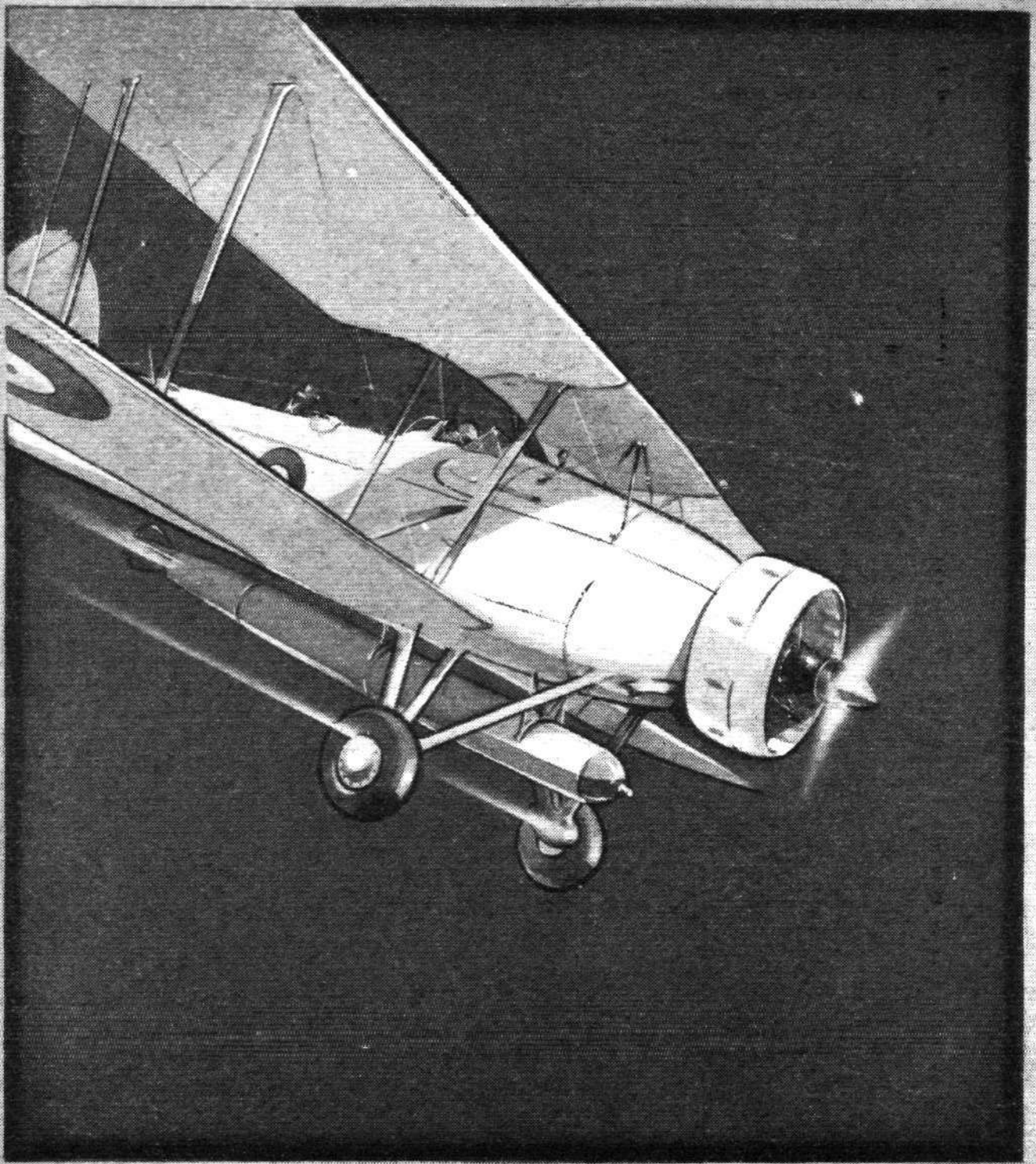


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# FLIGHT

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## Another Air Minister

IF the promptitude with which the reconstruction of the Cabinet took place last Friday may be taken as a criterion, the next few months should see a distinct "hustle" in getting on with the expansion of the R.A.F. Mr. Ramsay MacDonald drove to Buckingham Palace at 3.45 p.m. to hand his resignation to His Majesty the King, and by 6 p.m. Mr. Stanley Baldwin had become Prime Minister and a meeting of the Privy Council was held.

Unfortunately, the expansion of the Royal Air Force cannot be accomplished by the exchanging of seals of office, and a great deal of hard work will have to be done by everyone concerned before the enlisting of personnel, the building of quarters for them, the establishment of new aerodromes, and the building of new aeroplanes and engines can be got well under way, let alone completed.

It is naturally to the new Air Minister that the country will look for the successful accomplishment of this great task. Sir Philip Cunliffe-Lister takes over his new office at a very difficult time. The problems facing him are many and varied, and it is to be assumed that it will take him some time to familiarise himself with his work. It is for this reason that *Flight* has often in the past lamented the procession of new chiefs at Gwydyr House. No matter how able a new Air Minister may be, the fact that he has become the political head of a highly specialised service must of necessity mean a certain loss of time before the machinery is working smoothly again, even with all the help which the permanent officials can give.

The new Air Minister has not, so far, had any direct contact with air matters. His experience at the Board of Trade may stand him in good stead if and when the Air Ministry decides to give effect to the recommenda-

tions of the Gorell Committee, but the most urgent task with which Sir Philip is faced relates to Service rather than to civil aviation. There may be those who see in the fact that once upon a time Sir Philip was a member of the Select Committee on High Prices and Profits, and in the emphatic statements made by the Government during the Defence Debate that profiteering would not be tolerated in connection with the R.A.F. expansion, a danger that our aircraft and aero engine constructors may be asked to make bricks without straw. That fear, however, need not be taken very seriously. It has not been the aircraft industry's fault that orders have been small during the last few years, and when it is called upon to increase its production quite suddenly and to a considerable extent it is entitled to fair remuneration, and Sir Philip Cunliffe-Lister as a spender will probably be in a mood different from that of Mr. Philip Lloyd-Greame as a saver in 1919.

### Post with a Difference

We are certain that there are many in the aviation world who will feel that the interests of Britain's air defence would have been better served by appointing Sir Samuel Hoare Air Minister, a post which he has held in the past and in which, on the whole, he did very well indeed. He would, in spite of the gap in his connection with air matters, have picked up the threads quite quickly, and speed is very much the essence of the contract where the expansion is concerned. However, the salary of the Secretary of State for Air is only £3,000 as compared with £5,000 for the Foreign Secretary, and it was, perhaps, too much to expect Sir Samuel to accept an "Irishman's rise."

Of Lord Londonderry, the retiring Secretary of State for Air, it may be said that he held the post during a difficult time. It was probably not entirely his fault that during his term of office Britain's Air Force fell far behind those of other nations in numerical strength.



The blame for that must rest with the Cabinet as a whole, although possibly a stronger personality might have succeeded in impressing the risks on the other members of the Cabinet. By his great personal interest in aviation and by the fact that he became a pilot while he was Air Minister, Lord Londonderry did at any rate set an example which future Secretaries of State for Air will do well to emulate.

## A Landmark

**F**OR the first time, in this week's issue of *Flight*, a detailed illustrated description of the Short "Sarafand" military flying-boat is published. Although this machine is several years old, its first test flight having been made in 1932, it has been the subject of extensive experiment, and for this reason the Air Ministry has been unwilling to let data be published until now.

That the machine was not, after all, found to be exactly what was wanted, and that orders for a considerable number of smaller flying-boats have now been placed, does not detract from the interest in the machine. It has been flown extensively, it has been moored out in all sorts of weather for long periods, including gales of 50 m.p.h., and it has had an Alclad planing bottom substituted for the stainless-steel bottom originally fitted. The accumulated experience has taught both the R.A.F. and the manufacturers a great deal, and has shown that

a flying-boat of more than thirty-one tons is quite a practical proposition, even without departing far from normal practice.

The ratio of gross weight to tare weight is 1.56, so that the machine carries as disposable load 56 per cent. of its own weight. Bearing in mind that it had to be designed for military requirements, and that it was the first flying-boat of this size to be designed and built by Short Brothers, that is a very creditable achievement. It is not to be doubted that with the experience gained since the production of the "Sarafand" a good deal better results could be obtained in the future. The fact that the Air Ministry authorities and the R.A.F. flying-boat squadrons have come to the conclusion that smaller flying-boats are of greater use tends to make one contemplate the application of the lessons learned with the "Sarafand" to civil rather than to Service boats. We believe we are right in saying that if Short Brothers were asked to design a civil flying-boat for long-range work they would now turn to the monoplane type. Every pound of drag saved means a considerable increase in cruising range, and as it is, perhaps, unlikely that civil flying-boats of more than 5,000 h.p. will be wanted in the near future, the problem of installing six engines in a monoplane would not be at all likely to arise.

Thus it may, perhaps, be said that the "Sarafand" represents the maximum size of a practical biplane flying-boat, and that if and when the Empire air routes come to be operated by really large flying-boats, they will probably be monoplanes.



**A LOW-WING CONVENTION.** This striking photograph, taken at Tempelhof, shows some of the 154 machines which took part in the recent Deutschlandflug (Circuit of Germany). In the foreground are a number of Klemms, a squadron of which, as reported last week, carried off the principal award.

# The Outlook

## A Running Commentary on Air Topics

### Using Flying Boats

**R**EMEMBERING the very considerable amount of water covering the surface of the world as a whole, the use of flying boats for larger sections of the Empire routes has always appealed to us as a logical development.

The possibility of putting boats on the Singapore-Brisbane section has already been considered, but does not now appear to be very great. The Australian authorities have shied at the additional expense, and there are sundry route and operational difficulties. It has already been recorded in *Flight* that the Indian section has been surveyed from the aquatic standpoint, and the possibility of using boats between Mombasa and Durban on the African route will also be discussed again in due course.

If the last plan materialises, flying boats will probably be used exclusively between Europe and South Africa, the last section to Cape Town being operated completely by South African Airways.

### Aircrew Safety

**D**URING the past month or so there has been a positive flow of hospital or semi-hospital cases resulting from starting mishaps. In any circumstances there is an element of danger in the business of starting an aeroplane engine by swinging the aircrew. The operator may slip or the engine may kick back.

The time has come when all machines should have inertia, electric, or direct mechanical starters operated from the pilot's cockpit. Aircrew swinging should be as unusual a sight on aerodromes as handle-starting is on the roads.

Incidentally, the danger to wandering passengers from revolving aircrews (a fatal accident of this kind was reported last week-end) would be very much less if all machines had their aircrews painted either cream or white. The first of the Hillman D.H.86's has white aircrew blades, and the danger area shows up clearly as a white disc at all engine speeds.

### Stable Biplanes

**L**ATERAL stability and control have occupied the attention of designers and experimenters since the beginning of flying. Most modern aeroplanes are reasonably good in this respect, but all aircraft hitherto produced will stall, and most of them will spin if permitted to exceed the stalling angle. The accidents due to spinning are probably nothing like as numerous now as they were some years ago, the Handley Page slot and the reiteration by the instructor at every flying school of the dire penalties likely to be incurred each having contributed their share towards the avoidance of what was, once upon a time, the most frequent cause of disaster.

Nevertheless, there is still room for the aeroplane which does not need to be balanced on a knife-edge when near the stall, and the biplane arrangement described in the Annual Report of the National Physical Laboratory and published on p. 641 of this issue, forms at least an interesting contribution to the subject.

Briefly, the scheme—which, we understand, is due to Mr. H. B. Irving—lies in giving the wings a pronounced stagger and forward sweep, with an exaggerated dihedral of the lower wing. The upper wing is heavily tapered. Model tests on such a biplane with R.A.F. 15 wings showed

that the combination was stable laterally up to angles of 40 degrees. At the same time maximum lift was slightly increased and the maximum lift/drag ratio unaffected. There was a slight drop in lift/drag ratio at small lift coefficients, i.e., at high speeds, but this seems to be the only disadvantage, and a slight one at that, of the arrangement. When tested on a model with more modern wing sections the arrangement was not quite so good, but was still such as to promise good stability on a full-scale aeroplane. There may be some structural disadvantages in the suggested arrangement, but it would appear to be well worth trying out in actual flight.

### No New Thing

**A**LTHOUGH air displays do not now fill the aeronautical fixture list with the solidarity of a few years ago, organisers and demonstration pilots must sometimes wonder whether it is possible to do the same thing in a new way. In other words, to attract the eyes of a multitude of hardened amateurs and visitors who have seen the same machines and the same pilots on a number of occasions.

At Hatfield last Saturday interest was obtained and sustained by the simple, and possibly accidental, little trick of holding the visitors' attention while the pilot took off, and pointing the machine out after a considerable interval at the moment when the pilot was due to start his display. Other machines necessarily arrived during the proceedings, and these were all the more exciting for that reason.

The possibility of organising a really spectacular approach of a high-speed aeroplane, whether Service or civil, has not often been exploited. A fighter, for instance, might appear in a devastating terminal velocity dive after being pointed out quite suddenly as a mere speck in the blue. The variations of this procedure should be quite numerous.

### Rules to be Obeyed

**N**OW that the road user has, by fair means and foul, been encouraged in the view that order and discipline are essential to general safety, the time has come for the amateur pilot to realise his responsibilities.

A few still do not trouble to keep to the rules of the air, which are even more vital than the rules of the road. The practice of turning on or even before the aerodrome boundary has been reached, or of crossing directly over an aerodrome at an unreasonably low height are both examples of carelessness which might have serious consequences.

At long last the private owner is realising that the Air Ministry means what it says when he is ordered to keep clear of controlled areas in Q.B.I. conditions; though one can still wander radio-less right into Croydon when visibility is confined to a few hundred yards without being punished other than by the glares and hard words of the righteously incensed control officer.

At club and such aerodromes, however, examples of sheer carelessness can be seen hour by hour, and at regular intervals some law-abiding pilot is frightened out of his wits. Blind as modern light aeroplanes still are in certain directions, even the most careful pilot finds himself breaking rules on occasion, but consistent care would go a long way towards the prevention of minor mishaps.

R.A.F. UNITS VISITED

# THE CADRE SQUADRON at HUCKNALL

No. 504 (County of Nottingham) (Bomber) Squadron

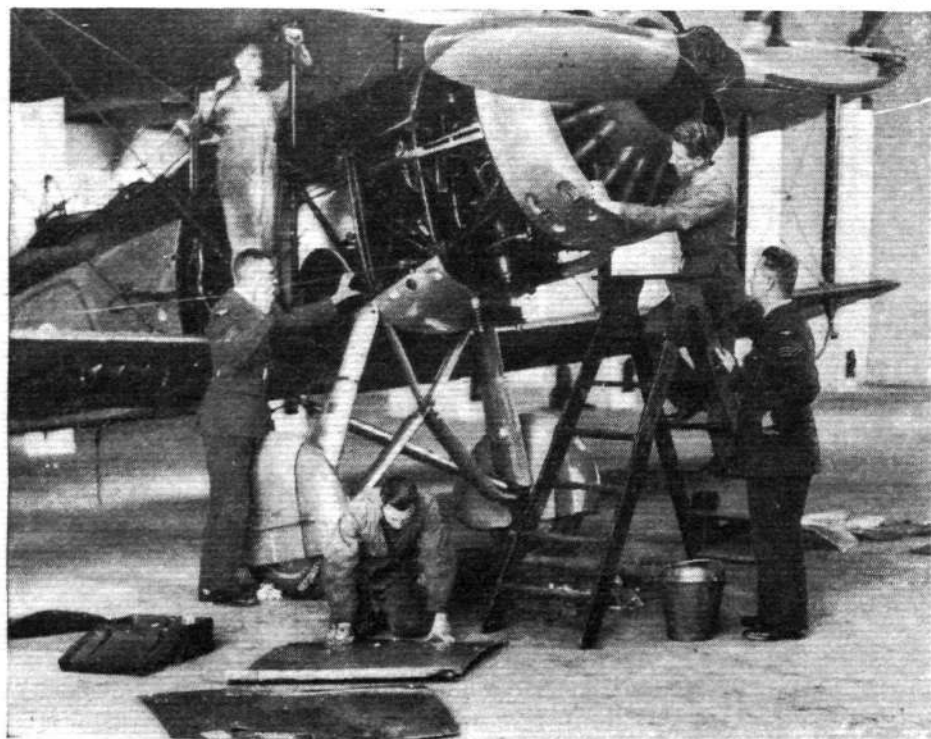
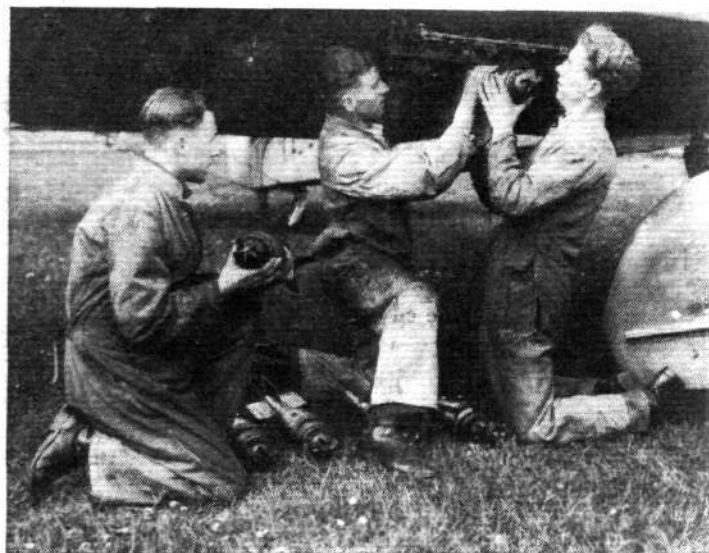
By MAJOR F. A. de V. ROBERTSON, V.D.

WHEN the non-regular squadrons of the Home Defence Force were established, most of them were located near large industrial towns, with the idea, partly, that such towns would provide a good recruiting ground for trained mechanics as aircraftmen for the squadrons. In some cases this expectation has been fulfilled, but in others it has turned out that recruits want to join an Air Force trade as different as possible from that which they follow during the week. The motor car mechanic will be anything rather than an engine fitter in the Air Force. He does not want a busman's holiday, although he will come out regularly to the aerodrome every week-end and work like a Trojan at some trade completely different from his own. That is the experience of the Cadre squadron at Hucknall.

This tendency certainly implies keenness, and one cannot spend five minutes on Hucknall aerodrome without becoming aware of the air of enthusiasm which permeates all ranks. No. 504 (County of Nottingham) (Bomber) Squadron comprises four classes, the regular and the Special Reserve officers, and the regular and the Special Reserve airmen. All alike are obviously full out for the squadron. Perhaps the first thing which strikes a visitor is a board in the Commanding Officer's office, on which there are seventy-eight hooks, representing the establishment of Special Reserve airmen. On each hook hangs a small full-length photograph of one airman, with details attached. There are no blank hooks, which shows that the squadron is up to establishment. It also shows that the C.O. (Sqn. Ldr. H. S. Kerby, D.S.C., A.F.C.) takes a personal interest in each of his S.R. men. As a matter of fact there is a waiting list of very desirable young men who want to enlist in the squadron, but must wait for a vacancy. During *Flight's* visit to Hucknall, three very smart young men turned up, who might from their appear-

ance have been applicants for commissions, but who wanted to enlist. The Territorial Army would give a great deal to see such a class of recruit, but these young men had to be put on the waiting list.

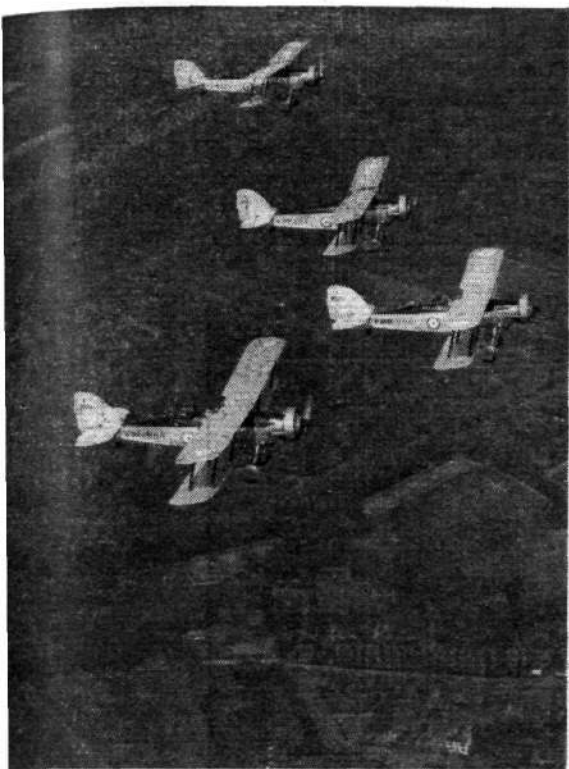
It is much the same with the officers. The establishment provides for six regular officers, including the C.O., and seventeen Special Reserve officers, including one Flight Lieutenant in the Medical Branch. Whereas the airmen are all Nottingham men, the officers come from all over the country, some from Lon-



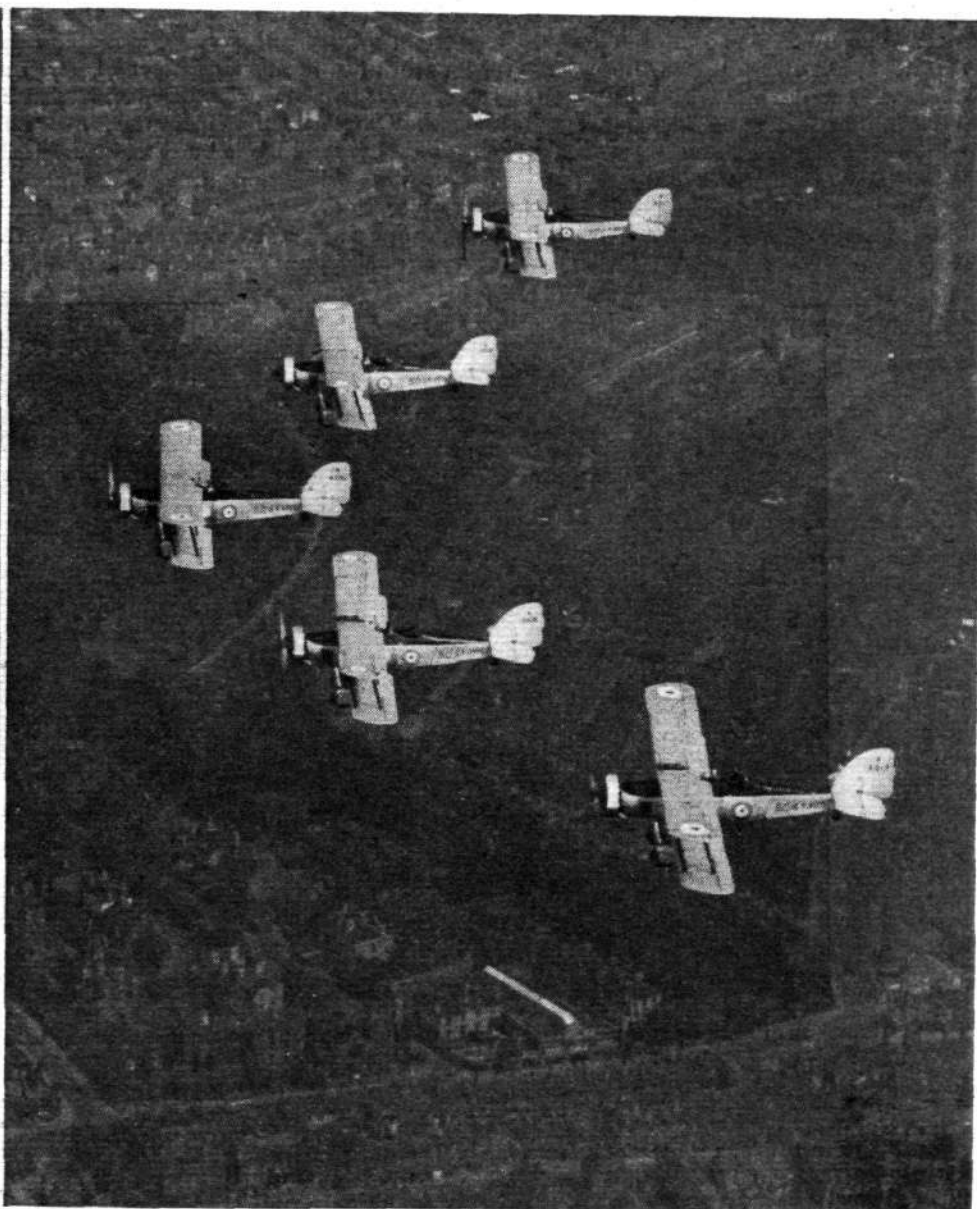
don, some from Manchester, and some from other places, also not very near to Nottingham. Their undertaking obliges them to do at least twenty-four hours' flying per annum, but such a paltry minimum as that would not be tolerated in No. 504 Bomber Squadron. Most of them drive up every Saturday afternoon and take up their residence at Hucknall for the week-end, and they work hard until the moment when they have to set off once more for the offices or other haunts in which they earn their living. In the officers' mess *esprit de corps* is obviously the predominating feeling, regulars and Special Reservists showing no difference at all in their enthusiasm for flying and for all forms of squadron work.

"A" Flight is the regulars' flight, and is regarded largely as the training flight. The S.R. officers are taught to fly *ab initio* in the squadron. Within the last eight months two S.R. officers of the squadron have been given short-service commissions in the R.A.F. and one was given a permanent commission. Conse-





From left to right, the accompanying *Flight* photographs taken at Hucknall show aircraftmen at work on one of the Wallaces; armourers loading - up with practice bombs for use on the range at Waddington, and formations of No. 504's "Wallaces" flying over their home city of Nottingham.



quently, at the moment of writing, there are three new officers being trained on Avros, and not yet able to do full work on the "Wallaces" with which the squadron is equipped.

"B" and "C" Flights are commanded and manned by S.R. officers and men at the week-ends. For the rest of the week a regular officer is put in temporary command of each flight, and carries on the routine work and sees to any repairs and maintenance which may be necessary for the machines. On Saturday afternoon the regular hands over to the S.R. Flight Lieutenant—and the *Air Force List* shows that one of these S.R. Flight Lieutenants has been granted the Air Force Cross.

### Nottingham's Pride

Nottingham city is evidently very proud of its squadron, and with good cause. It is a great industrial city, and most of the prominent employers of labour, such as Boots, Players, the Raleigh Cycle Co., and the extensive lace industry are strong supporters of the squadron, and highly approve of their employees serving in it as airmen. It should be mentioned that now the Special Reserve sergeants take the same trade tests as are taken by regular R.A.F. sergeants, and it follows that the official qualifications of the two classes of N.C.O. are the same, although the regulars naturally have greater practical experience in the work.

A recent innovation is that the Special Reserve officers are to follow out the scheme of training laid down by the Headquarters of Air Defence of Great Britain for

regular officers of the Home Defence force. The latter go through the course in a year, and such expedition can hardly be expected of men who can give only week-ends to their squadron work. It is certainly right to aim high, and this is in the nature of an experiment. At first there must be speculation as to how long the average time will be for the S.R. officers to qualify under this scheme, and no time limit except the five years of their engagement has been laid down. With such a keen lot of men it may not be rash to prophesy that A.D.G.B. will be surprised at the results.

### Photographic Section

A special word of praise should be given to the squadron's photographic section. It consists of a regular N.C.O. and one regular and three S.R. airmen. The photographs turned out are of a quality which stands high even among the products of other R.A.F. photographic sections. This excellence, it may be remarked, is not due to the possession of anything startlingly new in the way of aerial cameras or other equipment.

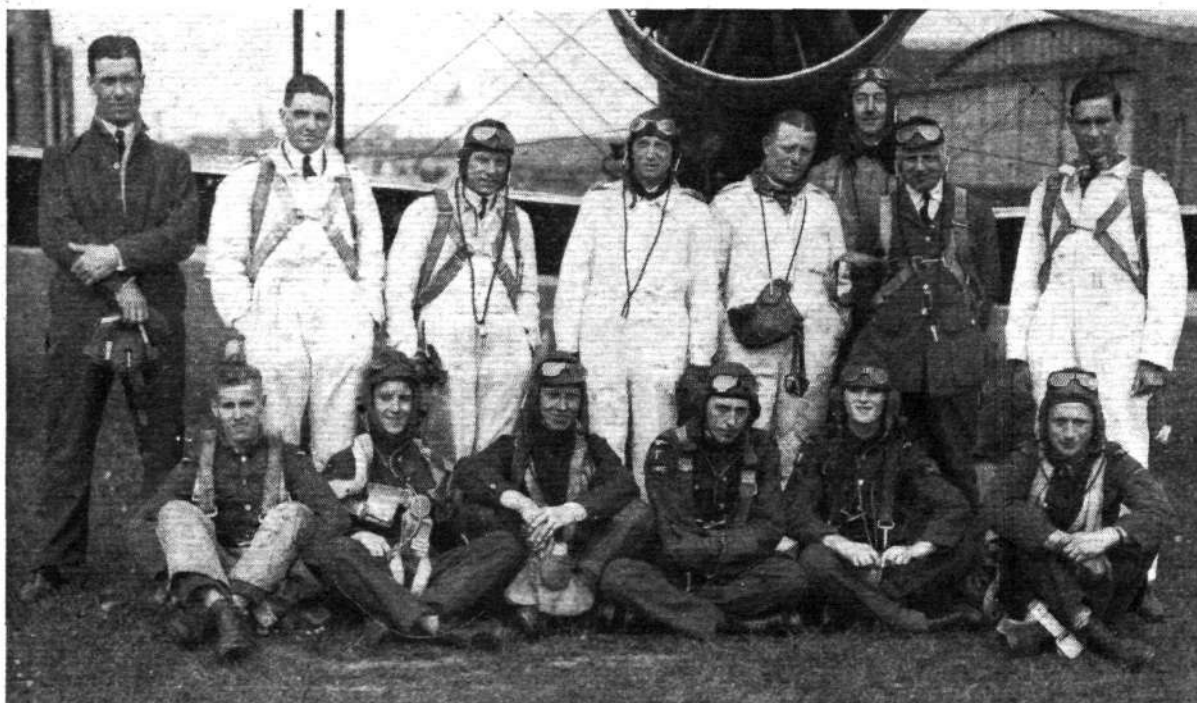
At the beginning of May, No. 65 (Fighter) Squadron came up from Hornchurch to affiliate with No. 504 B.S. No. 65 F.S. is equipped with "Demons," and practised attacks by two-seater fighters on the "Wallace" bombers. It was an interesting occasion, which everybody enjoyed and from which much profitable experience was gained.

Cadre squadrons must necessarily do much of their training work on Sundays, but the religious side of the

day is not neglected. There is Church parade every Sunday morning at 8.30, and no flying takes place until after it is over. The church is only a war-time hut, but it has been fitted up inside with great care and taste, and really looks like a small chapel of some country house. This is one more instance of the attention to detail with which the Nottingham squadron carries out everything which it undertakes.

The squadron would naturally feel happier if it were blessed with more aircraft. As initial-equipment aircraft it possesses only nine "Wallaces" and two "Lynx"

Avros. Aeroplanes *will* become unserviceable occasionally, even in the best-regulated families, and as the reserve machines may not be brought into general use except in special circumstances it is not always easy for this squadron to put a full squadron formation of nine machines into the air. That makes it all the more creditable that on the last Air Exercises No. 504 B.S. turned out with nine "Wallaces," and all its officers fully trained pilots. That shows what keenness can do, and largely unpaid keenness at that. Hucknall, in fact, simply smells of keenness, and the odour is sweet and inspiring.



A group of pilots and air gunners of No. 504 Squadron. The C.O., Sqn. Ldr. H. S. Kerby, D.S.C., A.F.C., is in the centre. (*Flight* photograph.)

### "Dagger" Data

Some interesting facts emerge from a fuel economy test recently carried out on a Napier "Dagger" Series II engine, under official observation by the Air Ministry to obtain data for use in tankage calculations. The engine was run for fifty hours at normal speed, developing 475 b.h.p., and showed a specific fuel consumption of 0.452 pts./b.h.p./hr.

The makers state that the engine completed the run without incident, and subsequent stripping showed that the condition of the cylinders, pistons, rings and valves was unaffected.

### Visibility

The illustration on the cover of this issue of *Flight* possesses a feature of particular interest in that it is drawn from an actual photograph taken during the process of landing on H.M.S. *Courageous*, and indicates the remarkably good view

obtainable during deck landing of a Fairey "Swordfish" T.S.R.—the latest addition to the Fleet Air Arm.

It will be noticed that the centre section struts are brought to an inverted vee in front of the pilot, and thus give no interference to his view during landing or when dropping a torpedo.

### I.F.S. Air Corps Changes

The Irish Free State Minister for Defence (Mr. Frank Aiken) has decided to abolish the post of Director of Military Aviation, and the present Director, Commandant G. J. Carroll, is to become Squadron Commander at Baldonnel aerodrome, County Dublin, the headquarters of the Army Air Corps. The Commanding Officer of the Air Corps, Major J. Liston, has been promoted to be second-in-command of the Dublin Military District.

## Two Special R.A.F. Display Numbers of **FLIGHT**

### Thursday, June 27

**T**HIS greatly enlarged issue will contain many features of topical interest, including articles on the work of the Royal Air Force, a review of the aircraft that will be seen at the display, a guide for visitors and illustrations of outstanding merit. In addition there will be the regular features devoted to commercial aviation, private flying, etc.

Copies of this issue will be on sale in the enclosures at Hendon.

### Thursday, July 4

**T**HE second special number, this issue will contain detailed reports, illustrated by many *Flight* photographs, of the R.A.F. Display and the Display (to which the public is not admitted) organised by the Society of British Aircraft Constructors. This issue will prove of particular value to those unable to visit the displays, and both special numbers will form useful works of reference.

*Definite orders for these special issues of "FLIGHT" should be placed with newsgirls and bookstalls.*

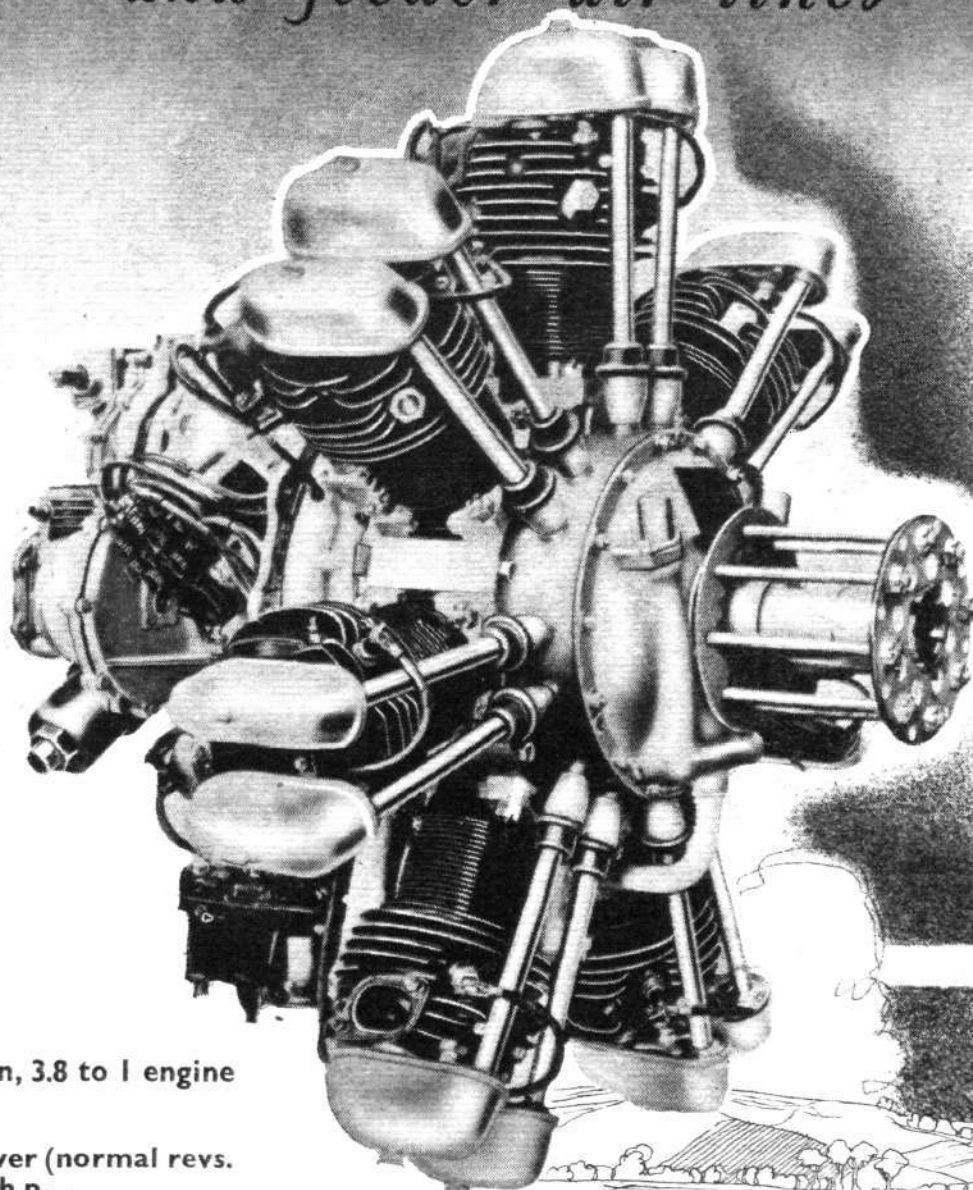




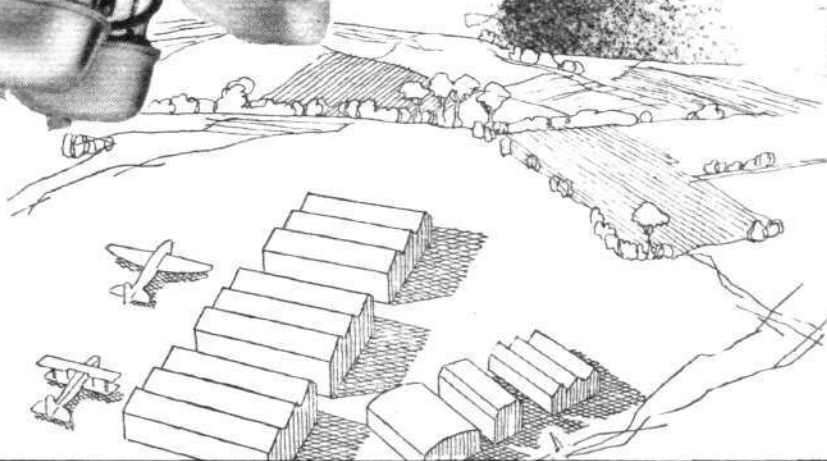
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*Ideal for training machines  
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- Geared fan, 3.8 to 1 engine revs.
- Rated power (normal revs. 2,250) 155 h.p.
- Maximum power (2,475 R.P.M.) 170 h.p.
- Overall diameter 40½ ins. Designed down to the smallest possible, ensures a low drag factor.
- Dry weight (including starter, fuel pump and air compressor) 375 lbs.



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Governing Director: Lord Nuffield

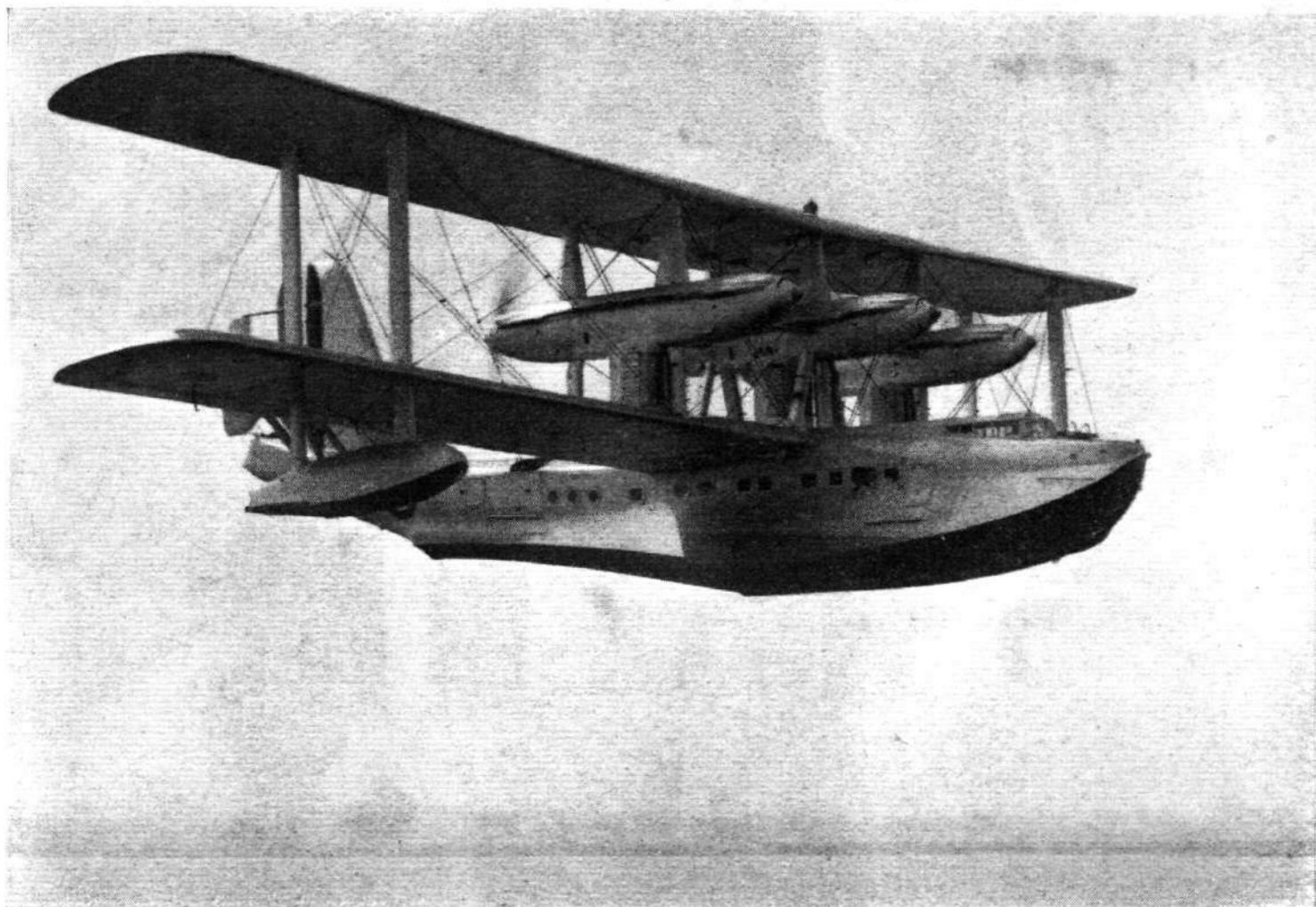




THE HAWKER "AUDAX" (Rolls-Royce "Kestrel"). A machine possessing all the qualities required for Army Co-operation work, accurate manœuvrability through the whole speed range, a good climb and a high top speed.

*Flight* Photo.

[Advt.]



## THE SHORT "SARAFAND"

*The Largest British Flying Boat Described for the First Time : Thirty-one tons : 150 m.p.h. : More Than 5,500 h.p. in Three Tandem Engine Nacelles*

FROM the earliest days of British aviation the name Short has been associated with marine aircraft. First came a number of twin-float seaplanes, and afterwards a series of flying boats. The latter may be said to have culminated in the Short "Sarafand," which was produced in 1932 to an Air Ministry specification, but of which it has not been permissible to publish a detailed description until now. The "Sarafand," known at first as the Short R.6/28, was primarily an experiment designed to ascertain the possibilities of the type. A civil machine of similar dimensions was projected about the same time, but in the interests of economy its completion was abandoned. When the "Sarafand" was being designed it was decided to make it a biplane in order to afford a comparison with the civil machine, which was to have been a monoplane. It was, therefore, planned on strictly orthodox lines and incorporated few new aerodynamic features, thus enabling concentration to be directed towards the structural problems involved consequent upon the large increase in size. The experience gained with the "Sarafand" has been extremely valuable to Short Brothers, who feel confident that with the knowledge and experience accumulated since this machine was planned, the design of a very much larger flying boat of increased aerodynamic efficiency could be undertaken with every prospect of success.

In its general conception the Short "Sarafand" is a normal biplane flying boat of all-metal construction, the most notable features of the general lay-out being the thickening of the lower wing-roots to avoid the necessity for chine struts, and the placing of the six engines in three tandem pairs, each

pair being carried on a single pair of inter-plane struts. This feature was first introduced in the Short "Singapore," a four-engined flying boat. The scheme of carrying two engines on such a simple structure was considered daring at the time, but was found quite satisfactory in actual service. It has the advantage of low drag. In the "Sarafand" the engines are Rolls-Royce "Buzzards" of the medium supercharged type, each developing a normal power of 825 b.h.p. at 2,000 r.p.m., and a maximum of 930 b.h.p. at 2,300 r.p.m.

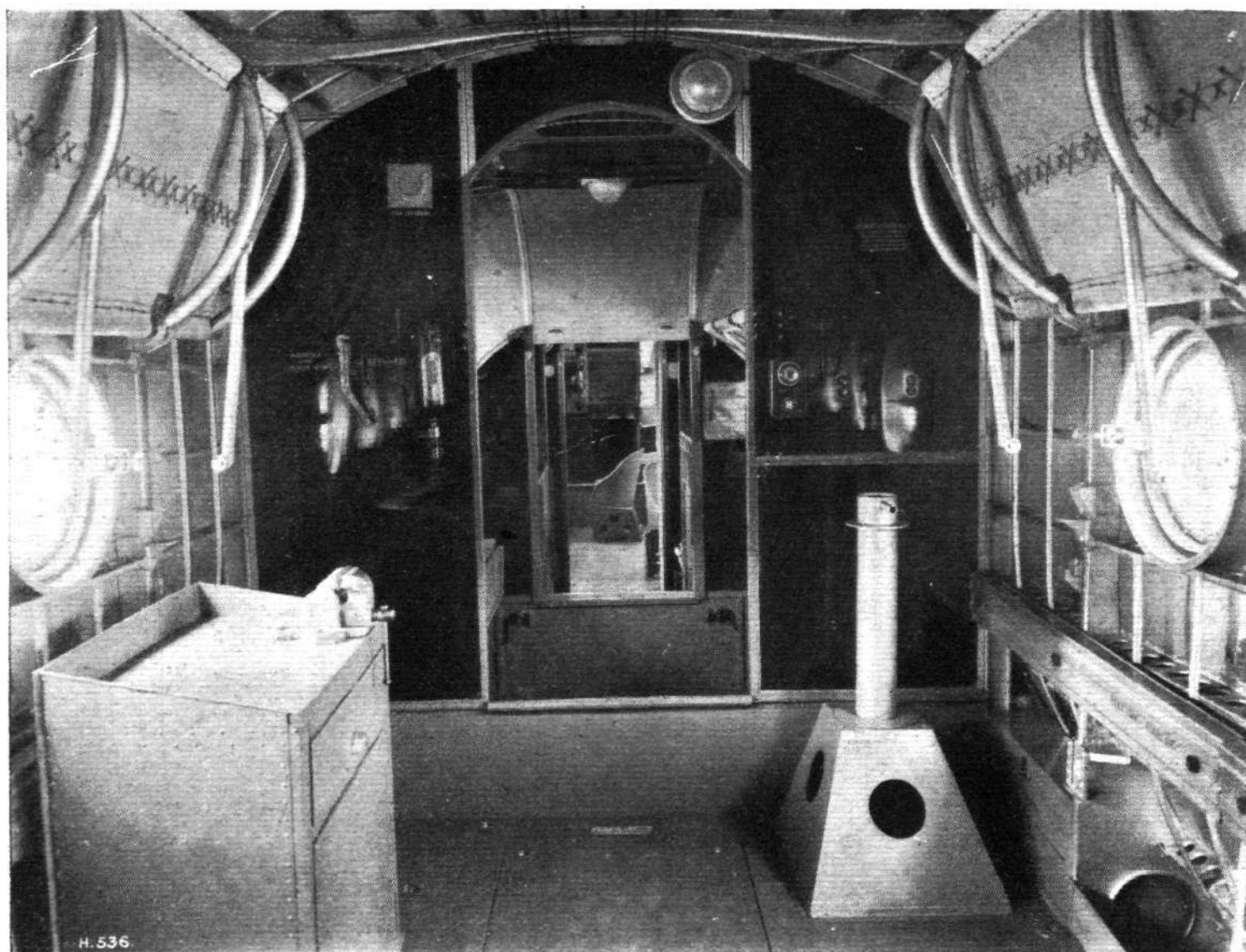
### Large Petrol Load

Monocoque construction is used for the engine nacelles, which are built entirely of duralumin. The normal petrol load of 2,112 gallons is carried in four tanks in the upper plane. A further quantity of petrol, in the form of an overload of 1,272 gallons, is carried in two tanks, one on each side of the hull, in the lower wing. Normally the engines are fed from the upper tanks by gravity, via a distributor in the central nacelle. Fuel from the overload tanks is pumped into the upper tanks by wind-driven pumps. The machine can be refuelled either by a pump driven by the auxiliary power unit or by a Zwicky hand pump. The oil tanks are situated in the nacelles, with Vickers "U" type coolers included in the circuit. Provision is made for warming the oil for easy starting.

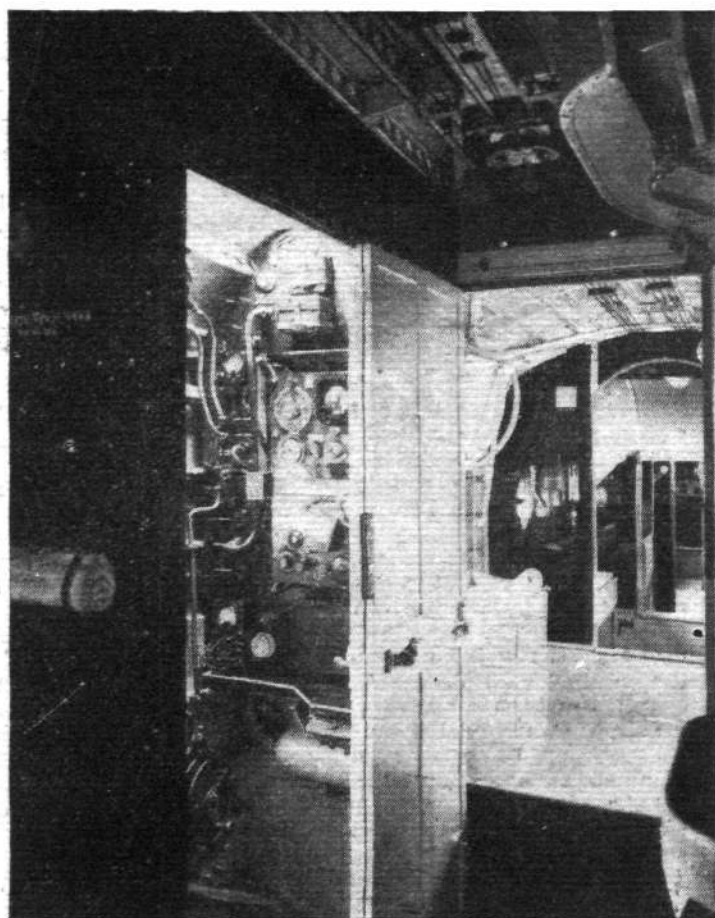
Separate water-cooling systems are provided for each engine, the radiators being mounted as pairs behind the front inter-plane struts, underneath the engines. Controlled shutters are fitted. The engines can be started by hand or by an R.A.E. Mark II starter. Two-bladed wooden airscrews are used on all six engines, those of the front engines having a diameter of 15ft., and those of the rear engines a diameter of 14ft.

Generally speaking, standard Short practice was followed in





Above is a view looking forward. The compartment in the foreground has a workbench with vice, etc., and a hatch through which can be lowered a spare engine. The picture on the left affords a peep into the W/T compartment.



the construction of the wings. The main exception is provided by the main wing spars, which are of stainless steel. These spars were found to be considerably heavier than the duralumin spars normally used on Short flying boats, but have proved very satisfactory.

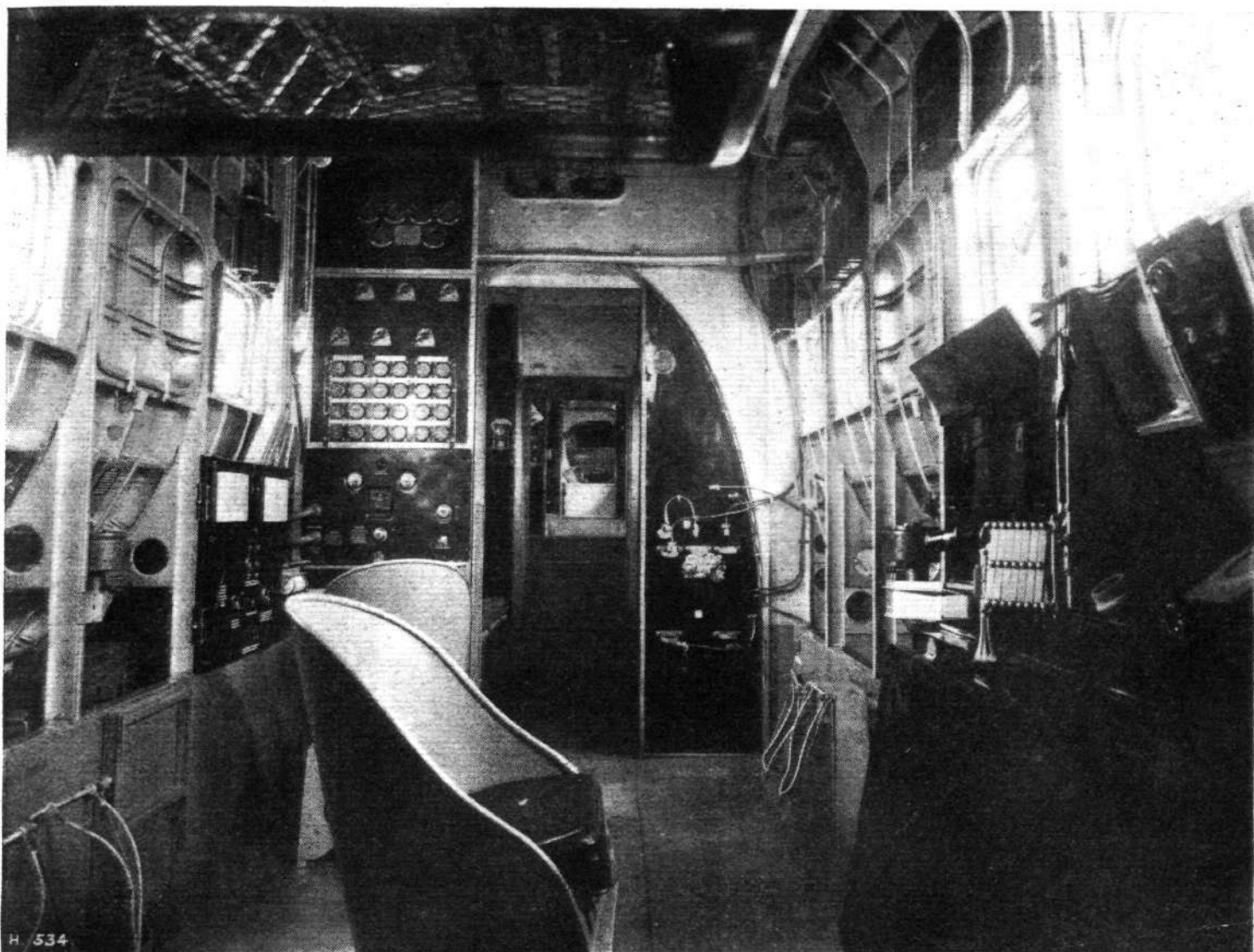
In spite of the large size of the Short "Sarafand," a monoplane tail is used. The fin is in two portions, of which the lower forms part of the hull structure, while the upper is attached to the tail-plane. The latter is braced by struts to the hull, and carries two adjustable fins, each composed of two halves, one above and one below the tail-plane. The single rudder is balanced by the set-back hinge method, and is servo-operated, the servo rudder being carried on outriggers from the main rudder. Extensive flying tests have shown the controls to be light and effective and adequate at the greatest loaded weight of 70,000 lb.

Considerable experimentation with hull construction was carried out with the "Sarafand." Originally the upper part of the hull was of duralumin construction, while the planing bottom was planked with stainless steel. This was later removed and a planking of Alclad substituted.

The bow compartment of the hull is arranged to take either a Lewis gun or a 1½-pounder automatic gun. The bomb aimer is installed in this compartment, a hatch being provided for the bomb sight. Owing to the size of the anchor used on such a large flying boat a winch is provided.

Immediately aft of the bow compartment is the pilots' cockpit, which is totally enclosed and fitted with a sliding roof and opening windows. The two pilots are placed in tandem in order to give the first pilot a maximum of view. A passageway runs from the front compartment to the ward room, which is equipped with a large chart table. The engineers' control panels are fitted in this compartment.





**The exchange :** In this compartment are the switchboard for the electricity supply, telephones, etc., and the engine instruments under the care of the engineer.

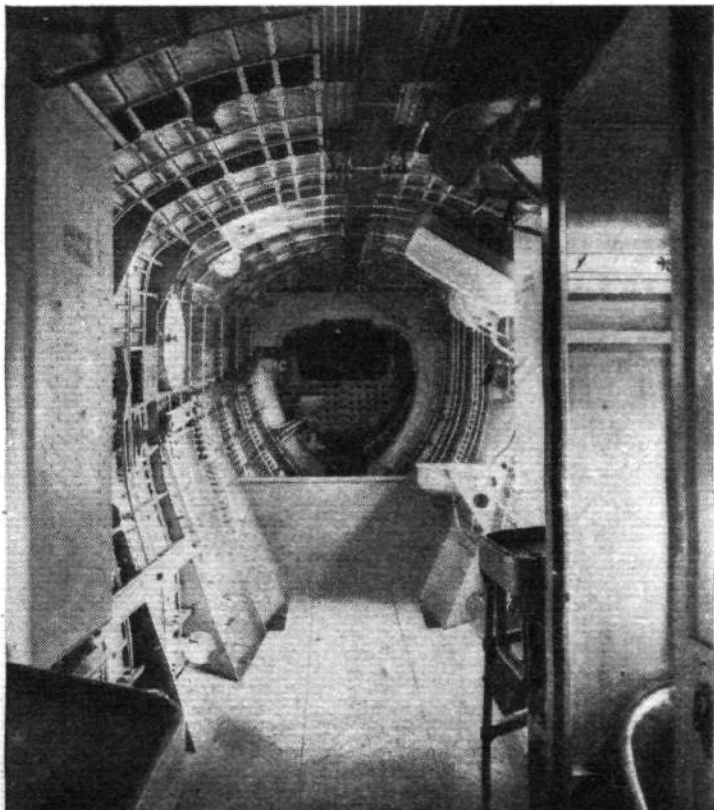
Between the lower wing spars is a compartment normally used as the officers' quarters. This is equipped with four folding bunks and a removable table. Adjacent to this compartment is, on the starboard side, a drying cupboard and the hatch to the deck of the hull, while on the port side is the cooking equipment. The crew's quarters follow immediately aft, and is arranged like those of the officers.

Between the crew's quarters and the midship gun positions is a compartment fitted with two folding bunks and equipped with stretcher stowage, provision for spare airscrews, tool kit and suitcase stowage. A small workbench with vice is also installed. In the roof of this compartment there is a large hatch through which a spare engine can be lowered on to a supporting cradle for transport purposes.

The midship gun rings are staggered, and in the space opposite the foremost was originally fitted the wireless equipment. The W/T was subsequently moved forward to the ward room in order to provide closer contact with the pilot and navigator. Aft of the midship gun positions is the toilet and wash basin and various miscellaneous stowages. A walk-way is provided to the extreme aft end of the hull, where there is a Lewis gun mounting for the protection of the tail. The gunner is protected by a folding draught screen.

A complete electrical installation (12-volt) is fitted, including internal lighting, navigation lights, flares, etc. Power is obtained from a 1-kilowatt wind-driven generator mounted on the front strut of the centre engine nacelle. Another 1,000-watt generator is directly coupled to the auxiliary power unit for use when the aircraft is moored. A telephone inter-communication installation links up nine stations on the boat. A complete W/T set is installed, with trailing long- and short-wave aerials.

The hull has a complete bilging system, which includes the wing-tip floats. In the hull there is a central duct connected to a number of branch pipes running to the various compartments, each pipe being fitted with a hand-controlled valve.

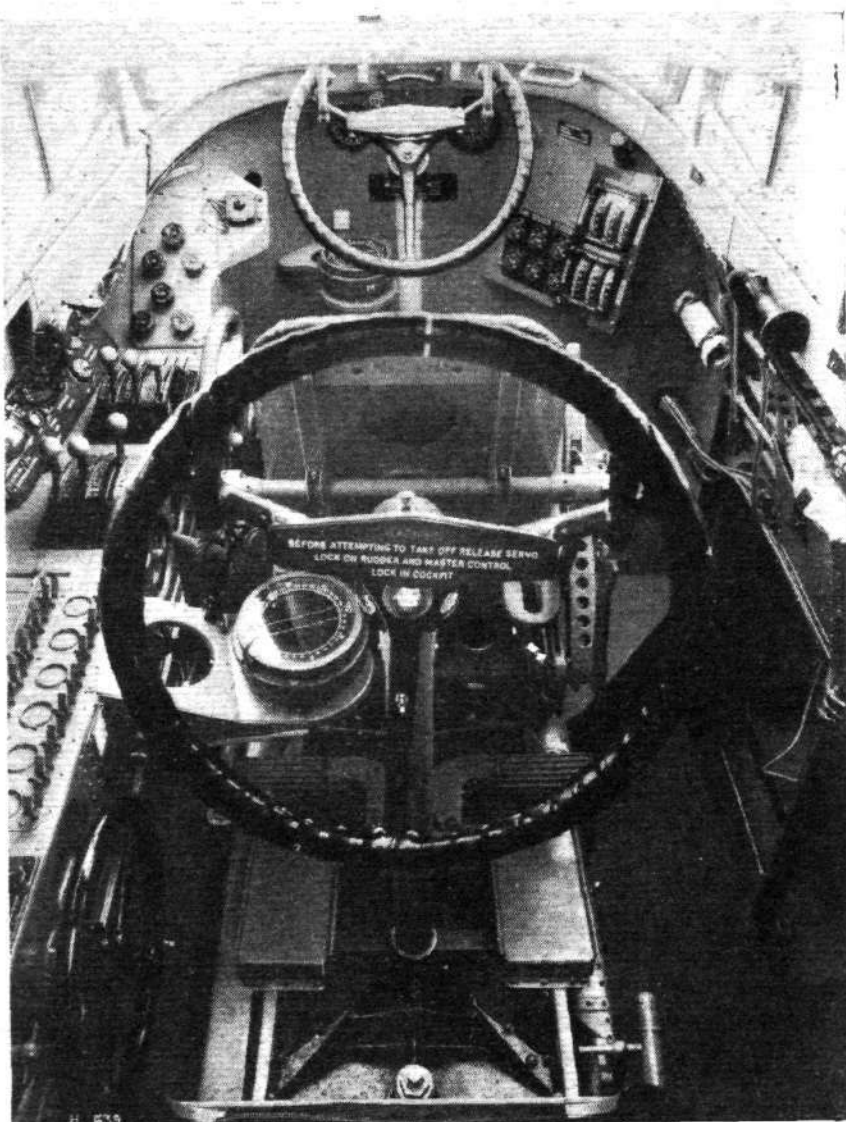
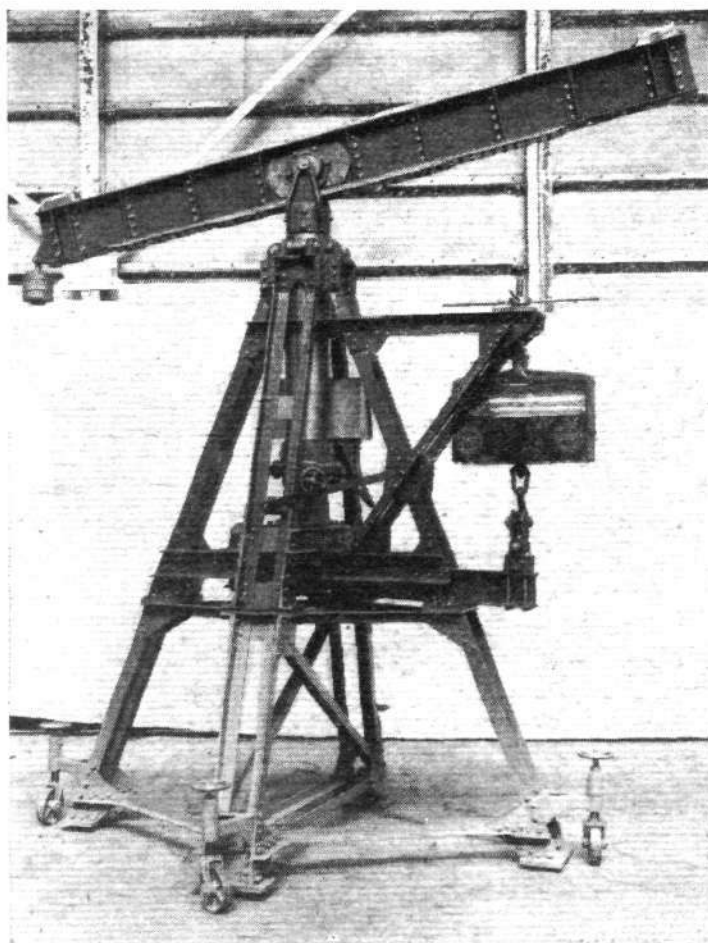


The aft stowage space, and lavatory equipment. A gangway leads to the gun position in the extreme stern of the hull.

**THE SHORT "SARAFAND"**  
Six Rolls-Royce "Buzzard" Engines

Dimensions			
	ft.	in.	m
Length o.a. ....	89	5	27.25
Wing span....	120	0	36.6
Wing chord ....	15	0	4.57
Gap between planes	16	6	5.03
Areas			
	sq. ft.		m <sup>2</sup>
Upper wing (total) ....	1,783		166
Lower wing (total) ....	1,677		156
Upper ailerons ....	184		17.1
Lower ailerons ....	184		17.1
Tailplane ....	247		23
Elevators ....	156		14.5
Fin ....	92		8.55
Rudder ....	81		7.53
Servo rudder ....	8.7		0.81
Side fins ....	73		6.8
Weights			
	lb.		kg
Tare (incl. water) ....	44,753		20,300
Disposable load ....	25,247		11,470
Max. gross wt. ....	70,000		31,770
Military load ....	5,970		2,710
Ratio of gross wt. to tare wt.	1.56		
Performance			
Max. speed, sea level ....	150 m.p.h.	(241.5 km/hr)	
Initial rate of climb ....	750 ft./min.	(3.8 m/sec)	
Service ceiling ....	13,000 ft.	(3,970 m)	
Range with full military load	1,450 miles	(2,340 km)	
Time to take-off (no wind) :			
At 63,000 lb. (28,600 kg) ....	31 seconds		
At 67,000 lb. (30,400 kg) ....	37 seconds		
At 70,000 lb. (31,770 kg) ....	47.5 seconds		

Below is shown one of the jacks used for lifting the flying boat off the ground when it is ashore. The ends of the beam are placed under points on the lower wing roots.



Although dual controls are provided, the pilots are arranged in tandem to give the first pilot the best possible view.

On top of the lower centre-section is mounted the A.B.C. auxiliary power unit, which is used for refuelling, bilging, charging the air bottles, and for generating electricity. The petrol and bilge pumps have a capacity of approximately 2,600 gallons per hour, and the air compressor will charge a 400 cu. in. bottle to a pressure of 200 lb./sq. in. in four minutes.

A beaching chassis complete with tail trolley is provided, and a jib for changing either of the six engines while the aircraft is afloat is supported on the lower plane, with ties to the upper plane.

Although positions are provided for two pilots, a three-axes automatic pilot is carried, so that on a long flight the aircraft controls may be abandoned by the crew for quite long periods.

### New Aero Engine Factory : Important Announcement

An important announcement regarding the Kingswood, Bristol, factory of Douglas Motors, Ltd., was made last week-end. The works, which are well known by reason of the manufacture of Douglas motor cycles and light aero engines, have been purchased by the British Pacific Trust and, it is stated, production will be started at an early date, on a very large scale.

The Douglas factory is one of the largest and most completely equipped engine works in the country, and very little time need be occupied in installing special machinery.

A close working arrangement with General Aircraft, Ltd., has been made and the new inverted vee side-valve engine recently designed by this company will be one of the engines to be put into production.

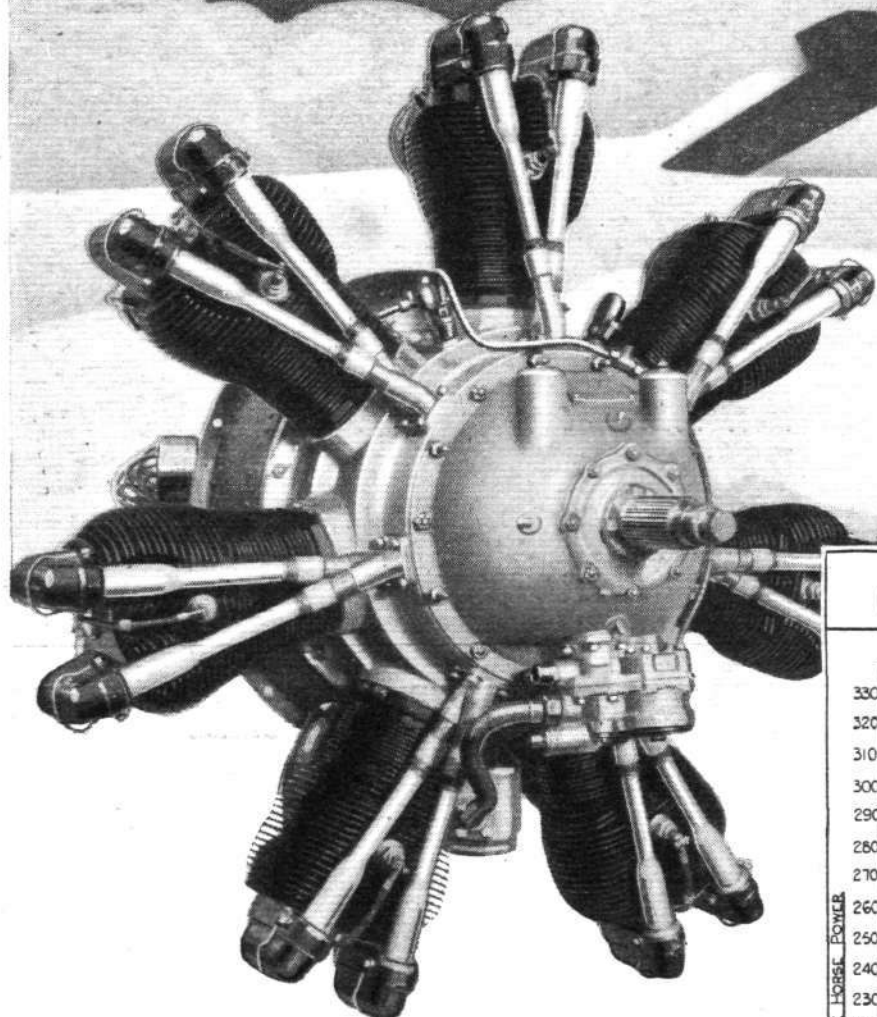
In addition to engines, a wide range of aeroplane equipment will also be produced.

Manufacture of the well-known Douglas products will be continued, including a light aero engine of the type which Mr. Kronfeld uses in the "Drone."



# CHEETAH VI

## AIRCOOLED ENGINE

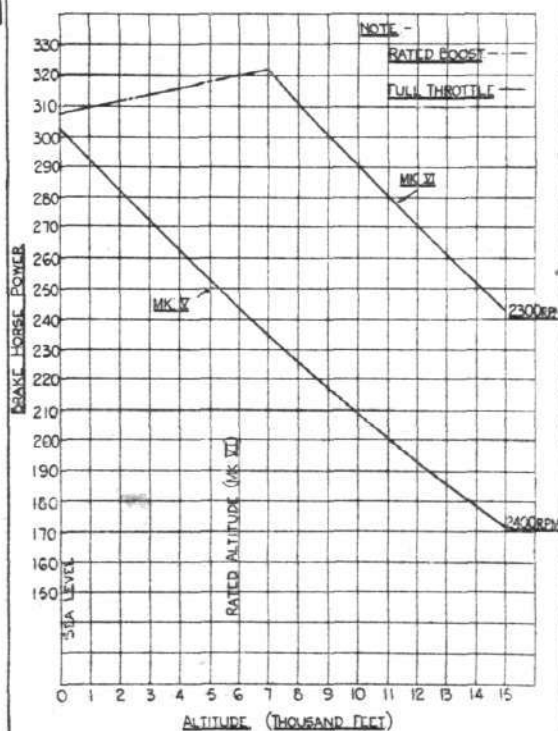


### PERFORMANCE DATA

	MK.V. (P.F.)	MK.VI. (G.F.)
Normal engine R.P.M.	2100	2100
Maximum engine R.P.M.	2400	2300
B.H.P. for take-off at sea level at normal speed	270 at full throttle	307 at max. perm. boost
Rated output at normal R.P.M.	270 at sea level	290 at 6000'
B.H.P. at maximum R.P.M.	303 at sea level	321 at 7000'
Fuel specification	D.T.D. 224	D.T.D. 224
Minimum octane value	77	77

### CHEETAH MK.V & VI ENGINES.

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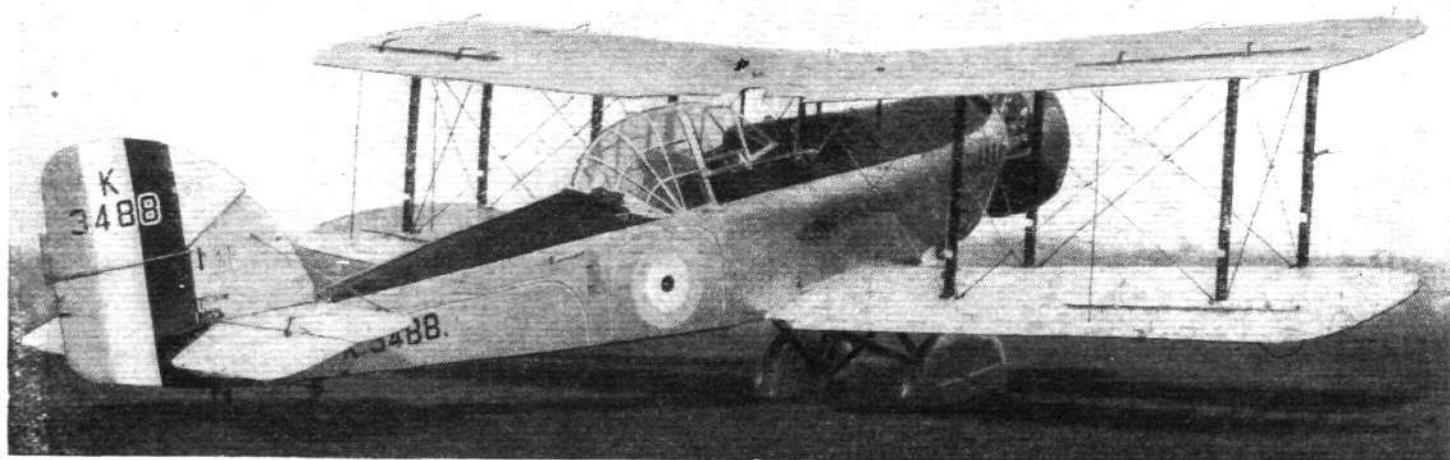
New type windscreen gives improved visibility and obviates water-formation. There are quite a number of other items of advanced design that will appeal to you, and don't forget that a 10 per cent. rebate on "Falcons" when fitted with Miles Split Flaps.

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# THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

## Lights Out at Pompey

Following the air-raid test carried out at Chatham, Portsmouth is the next district scheduled for a "black-out," which will take place in August.

## Another Jubilee

The twenty-fifth anniversary of the first flight by a Caproni machine was very suitably commemorated in Milan recently, when a presentation was made to Signor Caproni by his staff.

## Business from New Zealand

It is rumoured that the newly formed Union Airway Company of New Zealand is to order £100,000 worth of aircraft from British firms for the Dominion's air mail and passenger services.

## Towed Tankage

The latest application of Soviet Russia's gliders is aerial refuelling of aircraft. The aeroplane is refuelled by a pipe line from a tank in the glider which it is towing; the glider is then cast off.

## Solo—10s. a Second

While flying over Cambridge recently, Flt. Lt. Walker noticed some small white objects blowing about his ears. A few minutes later he realised that they were ten-shilling notes which had escaped from the pocket of his blazer.

## For Posterity to See

The original gondola used in Professor Piccard's second stratosphere ascent, in



PEOPLE WHO LIVE. . . . A striking aerial view of one of the glass-house areas of Guernsey, which now has a twice-daily air service, operated from Croydon via Portsmouth and Bournemouth by Cobham Air Routes.

1932, has been presented to the Science Museum, South Kensington. A formal presentation was due to be made yesterday by the Belgian Ambassador.

## The Modern Method

Aircraft are being extensively used in a geological survey of Northern Australia. The survey, which has just begun, is chiefly a search for mineral deposits, and is expected to occupy three years.

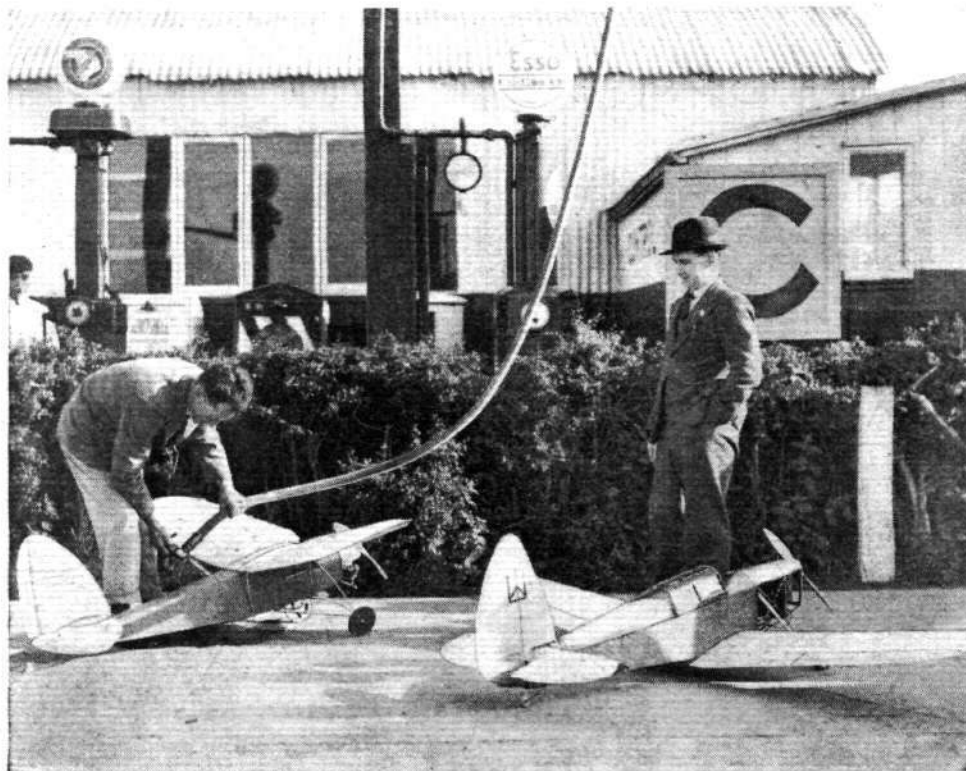
## Twenty-five Years Ago

From "Flight" of June 11, 1910.

"An important page in the history of the development of flight has once more been turned down by the splendid achievement of the Hon. C. S. Rolls on his Short-Wright type biplane with horizontal tail, in flying over the Channel and returning to his starting point without alighting on French soil."

## On the Air

Several aviation subjects are to be dealt with in B.B.C. broadcasts in the near future. Next Saturday Mr. F. D. Bradbrooke will give a talk on gliding (6.30 p.m., National); on June 26 Professor A. D. Peacock will tell Scottish schools about the differences between aeroplanes and birds; on July 1 Messrs. H. D. Wynn and W. H. Sutcliffe (chief instructor to the Midland Club) will discuss Midland flying clubs; and on July 13 Mr. E. C. Brown will give a running commentary on the opening of Leicester's new Airport, from 2.30 to 3.30 p.m.



CLAIMING THEIR RIGHTS: An amusing incident at the recent rally of model aero clubs at Sywell Aerodrome. Several petrol-driven models appeared, and the realistic Percival "Gull" in the foreground made the best performance in this section.



Flt. Lt. Johnson makes a final circuit—dead on time—around the Hatfield beacon after his aerobatic display with the "Tiger Moth." (*Flight* photograph.)

**A**MIDST the swimming and mannequin displays, the wheelbarrow races, the hat-trimming competitions (for men only) and the bottle competitions (neither for men only nor on accepted lines), the various flying demonstrations were all the more appreciated at Hatfield last Saturday.

Flying people appear to be favoured by the meteorological department, for, once again, a devastating morning developed into a very pleasant sunny afternoon, though the wind continued to blow with unabated violence until

## MAINLY

### *The London Aeroplane Club's Garden Party*

the evening. Consequently, the number of visitors by road or by air was severely curtailed, and it was all the more surprising that the two most lightly loaded machines due to appear arrived at Hatfield at all. Both Mr. Kronfeld's "Drone" and Mr. Collin's sailplane came in and each was shown off to full advantage.

Despite the comparatively small support, the winner of the arrival competition, Mr. "Pat" Hattersley, flying the British Continental Airways' "Rapide" with Mr. Farey Jones on board, touched down within a second or so of the mysterious time in the envelope.

The visitors drifted towards the swimming pool, where Mr. Vivian Holman, whose announcing throughout was above reproach, introduced the bathing and beach costume mannequins with unexpected insight. Mr. E. H. Temme, the Channel swimmer, gave a short talk and a demonstration; members of the Highgate Swimming Club, from the diving board, exhibited various gliding angles, wing loadings and methods of losing height quickly; and Miss Blanks showed us all how very easy and effortless a matter it is to swim quickly.

Meanwhile, Flt. Lt. W. E. P. Johnson appeared out of the blue—actually and not metaphorically—with a London Club "Tiger Moth" and proceeded to lose height in both an inverted and a normal spin before continuing with his singularly polished aerobatic display at a still safe altitude. Only when the "Tiger Moth" was brought down to five hundred feet or so did one realise the difficult conditions under which Flt. Lt. Johnson—who, incidentally, was originally trained at the London Club—was working. At that height it was possible to see how the machine was being thrown about in the vicious bumps.

Mr. Robert Kronfeld had already arrived over the aero-





# ERRESTRIAL

## atics, Acrobatics and Aerobatics at Hatfield

drome, given a short demonstration in the B.A.C. "Drone," and landed without undue "ballooning," when Mr. E. C. Collins' sailplane was pointed out by Mr. Holman. He had been towed over by an Avro 504N. from Dunstable, and, as one visitor remarked, would not be down on the ground for at least an hour and a half. Actually, Mr. Collins proceeded to get rid of his height quite quickly with a series of loops and stalled turns, though he made good use of his last thousand feet and hung about for a seemingly interminable period. The importance of gliding speed in Saturday's windy conditions was effectively demonstrated during the final approach to a landing just inside the boundary. Once on the ground Mr. Collins held the sailplane down with his elevators until assistance arrived.

Whatever other pilots thought of the wind it suited Mr. R. A. C. Brie in the matter of Autogiro demonstration. Rarely, if ever, has one seen the C.30 showing off so perfectly—stationary or even travelling backwards relative to the ground while into wind, and travelling, to use the expressive vernacular, "like a bat out of hell" down-wind. Time and again the Autogiro was left "sitting" fifty feet over the heads of the visitors, and the machine was, at all times, perfectly steady. In such conditions "trailing" tactics could only have been safely carried out by a pilot with Mr. Brie's vast experience of the type.

Thereafter, Capt. W. Percival showed off the paces of the "Gull" in his familiar and stirring manner, and Mr. E. D. Ayre proceeded to demonstrate the impossible with the B.A.C. "Drone." Grass-cutting at a ground speed

of 200 m.p.h. is almost as effective as an all but vertical bank is inspiring—especially with a machine as pretty as the "Gull" and split flaps plus a strong wind can make it fly extraordinarily slowly from the spectator's viewpoint. Grass-cutting at 30 m.p.h. is, perhaps, even more effective, though gusts made Mr. Ayre's job rather difficult on Saturday.

It was more than a pity that the "Comet" could not have been flown as a finale, and the party ended, as it should, in general conversation and dancing.



Members and guests on the lawn in front of the clubhouse during one of the lesser terrestrial competitions. (*Flight* photograph.)



(Top) Mr. Brie, with the help of a fair wind, shows exactly what the C.30 can do. (Centre) Hat trimming for men: Mr. C. J. Melrose and Mr. Barrington watched by an interested crowd during their battle with difficult materials. (Bottom) Mr. E. D. Ayre sets off, pipe in mouth, to give a demonstration of the impossible—with the B.A.C. "Drone." (*Flight* photographs.)

# LISBON STAGES an AERO SHOW

## A Mixed but Interesting Collection of Ancient and Modern Exhibits

**A**N unusual, highly interesting and admirably organised aeronautical exhibition opened in Lisbon on June 2 and remains open until next Saturday. It is unusual (writes *Flight's* correspondent in Portugal) because, unlike exhibitions in other countries, it is not organised with a view to getting orders for aircraft, engines or accessories. It is the fruition of the desire of a large-hearted and high-minded patriot, Major José Pedro Pinheiro Corrêa, of the Portuguese Military Air Force, to show to his countrymen the progress and development of aviation such as those who live in more highly industrialised and aeronautically developed countries know it.

It is intensely interesting, because of the combination of the historical with the technical, and it has been admirably organised in the face of great difficulties.

As this report is necessarily limited, we will confine ourselves to the aircraft and engines on show, with a brief and passing reference to ancillary equipment.

To start with engines, Great Britain is represented by a "Gipsy Major," a Rolls-Royce "Kestrel" IIS, Armstrong Siddeley "Panther," "Cheetah V" and "Tiger" (this last being sectioned and running. The characteristics of these engines are well known.

### From Czechoslovakia

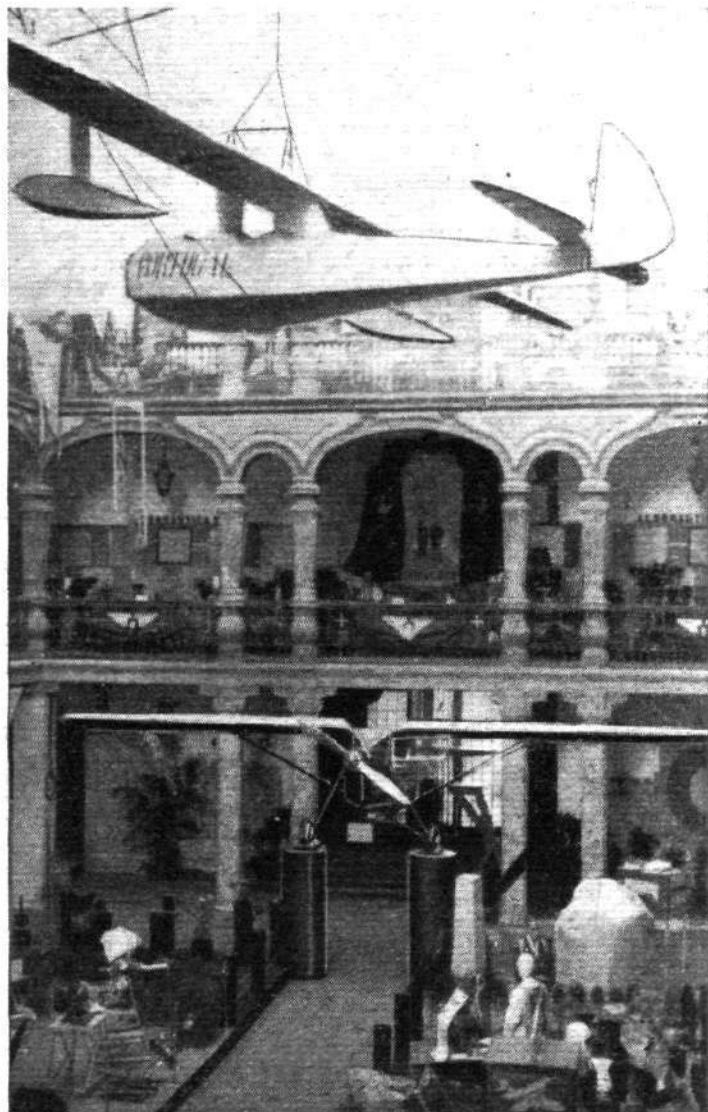
The Czechoslovakian firm of Walter has the following on show: "Minor 4," 75/85 h.p. four-cylinder-in-line-inverted; "Major 4," 120/130 h.p. four-cylinder-in-line; "Regulus II," 185/230 h.p. five-cylinder, air-cooled radial; "Gamma I," 150/165 h.p. nine-cylinder, air-cooled radial; "Bora RC," 250/270 h.p. nine-cylinder, air-cooled radial; "Castor II," 260/340 h.p. seven-cylinder, air-cooled radial; "Pollux III-R," 420/550 h.p. nine-cylinder, air-cooled radial. Numerically this is the most imposing show of engines at the exhibition. All are beautifully finished and well displayed on sensible stands, with a background of suitable propaganda.

The Junkers exhibit is "Jumo V" compression-ignition engine of 540 h.p.—the six-cylinder vertical two-stroke, opposed-piston, water-cooled unit.

Other German products are the 150 h.p. Siemens Sh.14a, seven-cylinder air-cooled radial; the 80 h.p. Hirth H.M.60R, four-cylinder-in-line air-cooled inverted; and an Argus six-cylinder inverted.

The French have sent two beautifully finished Hispano-Suiza engines—the 12-Xbrs twelve-cylinder, water-cooled 60 deg. vee and the 14-Hars, fourteen-cylinder two-row air-cooled radial, both of which have come in for a good deal of attention. On another stand is the powerful and imposing-looking Gnôme-Rhône K.14. Renault show the 120/145 h.p. "Bengali" and the 180 h.p. six-cylinder.

The foregoing are the modern engines on show. In the Naval Air Service Section are school engines, such as the old Clement-Bayard Type AM, eight-cylinder, 150 h.p., an old Hispano-Suiza 200 h.p., a Rolls-Royce "Eagle," an



In the main hall: Over the aisle is the D.H. "Leopard Moth" in which Lt. Humberto da Cruz and Sgt. Mech. Lobato flew from Lisbon to Portuguese Timor, and suspended from the roof is the Portuguese "Varela Sid" flying-boat glider.

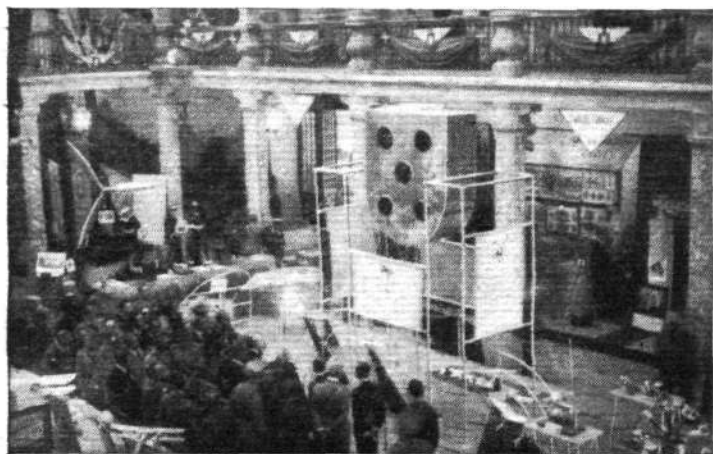
Isotta-Fraschini "Asso" 200, an ancient Liberty twelve-cylinder, an elderly Salmson, and an old Renault. All these are sectioned, and the "Eagle" is worked electrically with flash-lamp bulbs to represent sparking plugs. On other stands are a Napier "Lion," an "Airdisco," an old Hispano-Suiza, a Jupiter Ady and Gnôme-Rhône "Titan" (these last two made in Portugal), and a sectioned "Gipsy Major," which last is the only modern engine in the "school" section.

As already remarked, there are few aircraft, owing to limitations of space. On entering the Exhibition Palace one is confronted by an Avro-Cierva Autogiro, Type C.30. If one's memory is correct this is only the second Autogiro seen in Portugal; certainly it is the first C.30 type. Pride of place in the main hall was justly accorded to the D.H. "Leopard Moth" ("Gipsy-Major"), upon which Lt. Humberto da Cruz and Sgt. Mechanic Lobato performed a most meritorious (but little advertised) trip from Lisbon to Timor and back—42,670 km. in 278 hr. 30 min. flying time—without incident or accident towards the end of 1934. The aircraft looks no worse for the journey.

At the other end of the hall is a *Pou-du-Ciel* constructed in the military aeronautical workshops at Alverca.

There is also a portion of a "Pou-du-Ciel" in a not very advanced stage of construction; it is being built by a small group of about thirty Portuguese Air Scouts at their own expense.

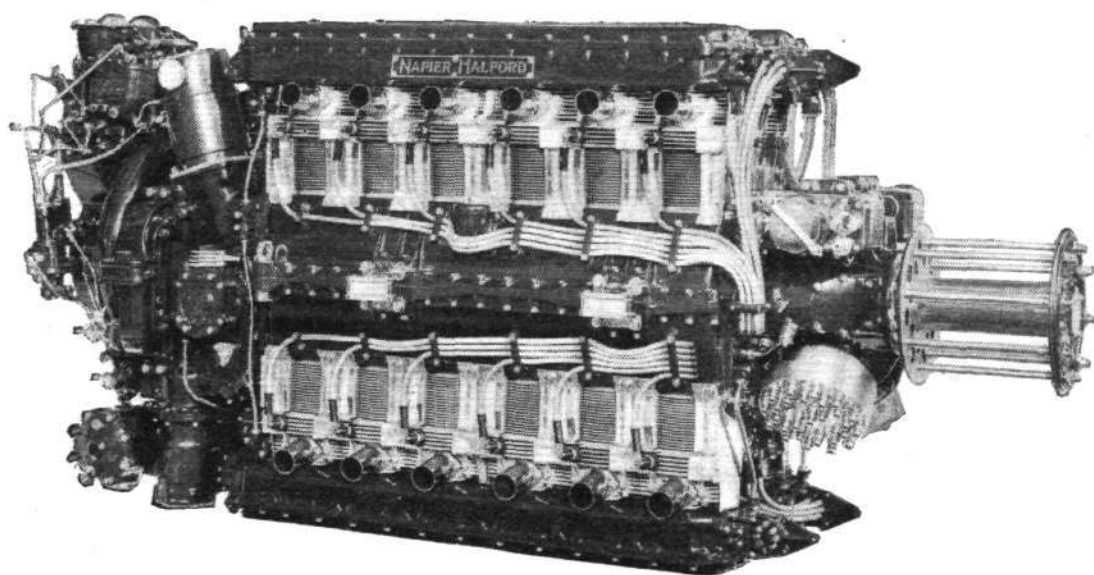
In the French Air Ministry Section is the Caudron C.460 (minus undercarriage and engine) which recently broke the world's landplane speed record at 505 km./hr.



The stand of the General Aeronautical Materials Workshops, Portugal's only aircraft factory. In the left background is the Junkers' "Jumo" engine.



# Dagger



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The only other aircraft are old machines of purely historical interest such as the Fairey IID (Rolls-Royce "Eagle") which in 1922 completed the first crossing of the South Atlantic on the occasion of the memorable flight by Gago Coutinho and the late Sacadura Cabral—a flight outstanding in the annals of aerial navigation.

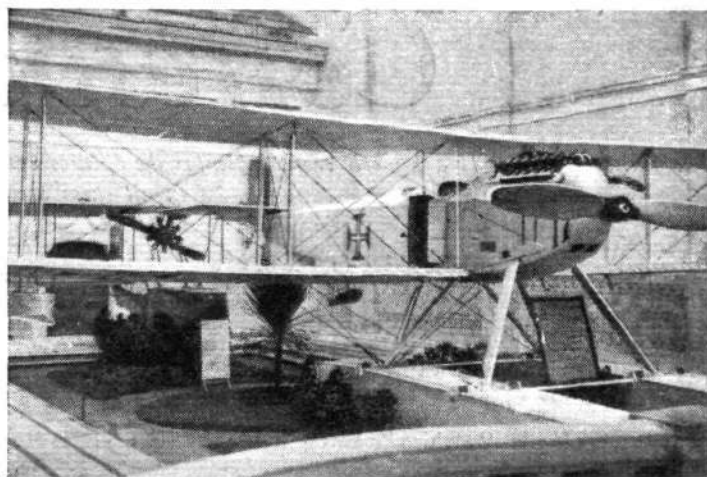
There are two Avro 626 fuselages, one fitted with Vickers guns and the other with Lewis to show the respective layouts.

For reasons of space already referred to, aircraft are mainly shown in the form of models, and the Italian and French Governments in particular have sent very complete collections, representative of many modern civil and military types.

British model exhibits include a D.H. "Dragon," "Dragon Rapide," "Dragon Express," "Leopard Moth," "Tiger Moth" and "Comet"; Fairey "Fox," T.S.R. biplane, "Scout"; and Boulton Paul "Overstrand." On the Imperial Airways stand are models (complete and sectioned) of Armstrong Whitworth A.W.15 ("Atalanta"), the Handley Page 42 ("Heracles") and Short "Scipio" and "Scylla."

Parachutes, camera-guns, cameras, gas masks, bombs, Hotchkiss A.A. guns, machine guns, accessories of all kinds, lubricating oils, wires, cables, lighting equipment, instruments—every imaginable thing connected with aviation is on show. The Reid and Sigrist pilot-testing apparatus is arousing the greatest possible curiosity and interest.

To complete the historical interest there is a very complete documentary record of the development and progress of aviation in all countries. One old engine on show bears a brass



The Fairey IID (Rolls-Royce "Eagle") in which Coutinho and Cabral made the first South Atlantic crossing in 1922. Behind it is another historical machine, a Schreck flying boat acquired by the Portuguese Naval Aviation Service in 1917.

plate on which is inscribed: "Peter Hooker, Ltd., Gnome et Le Rhone, Ltd., Walthamstow," and this is, without doubt, one of the forefathers of the present successful monsters.

## A WEEK'S WEATHER

HE who sets out seriously to predict the future vagaries of that notoriously fickle jade, British Weather, must have great faith in his prophetic capabilities. Even the Air Ministry refuses to commit itself to any extent and is usually pleasantly vague about that "further outlook" for the day after to-morrow. For these reasons *Flight* has studied with interest the claims of Mr. D. K. Bartlett, who specialises in "long-range weather forecasts," and it has been decided to publish, as a matter of interest, a weekly series of his prophecies, which, he states, are based on sound mathematical principles and are emphatically not guesswork. His first notes in this series are published below, but it should be clearly understood that *Flight* takes no responsibility for their ultimate accuracy or otherwise.

Mr. Bartlett writes: The weather on Saturday, June 15, for the Bristol and Wessex Aeroplane Club S.B.A.C. Challenge Cup, to be held at Whitchurch, near Bristol, will be mainly good as regards flying conditions, with some fairly high clouds generally, and should remain so until the following Monday, when rain will occur in easterly counties.

Future dates for outstanding weather conditions likely to affect flying are: *July 2*, generally disturbed; *July 10*, thundery in southern counties; *July 18-19*, thundery, particularly in the West; *July 23*, changeable; *July 29*, thunderstorms

### The Coming Week

FRIDAY, JUNE 14: Generally fair, bright, moderate breezes.

SATURDAY, JUNE 15: Mainly fine, some cloud.

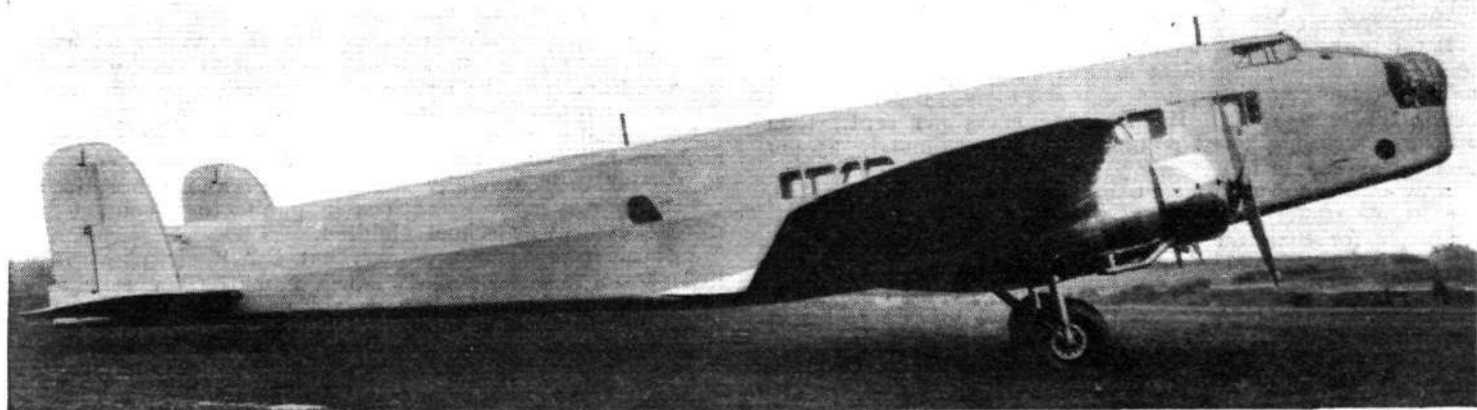
SUNDAY, JUNE 16: Fair conditions, a few showers locally.

MONDAY, JUNE 17: Unsettled and changeable in the south-east, distributed over Channel and farther south.

TUESDAY, JUNE 18: Fair and fine, with cloud over Channel and farther south.

WEDNESDAY, JUNE 19: Tendency for mist or fog in channel, with showers.

THURSDAY, JUNE 20: Mainly fine, with bright periods.



THE LATEST: It is now permissible to publish a photograph of the new Armstrong-Whitworth Bomber Transport—a low-wing cantilever monoplane with retractable undercarriages. The engines are Siddeley "Tigers."  
(R.A.F. Official Photograph, Crown Copyright).

# Correspondence

The Editor does not hold himself responsible for the opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

## EMPIRE AIR SERVICES.

[3046] Your correspondent, Mr. Mehta, in his letter of May 16, does his best to belittle the Imperial Airways Empire Services by a comparison with the Dutch K.L.M., at the same time disregarding some of the essential aspects of the case and pegging his arguments to what is definitely a mis-statement.

The first of the "strides" being made by K.L.M. is to double their service; Imperial Airways duplicated two routes, its Indian and South African services, five months ago. Secondly, as regards cabin silence, I have enquired of all friends and acquaintances who have travelled in Douglas and Heracles type aircraft, and opinion as to their merits seems equally divided; the Dutch, therefore, cannot be so far in advance in this respect.

Finally, the vexed question of speed: the Douglas D.C. 2 is stated in American official figures to have an operational speed of 165 m.p.h., and not 280 miles per hour or even 280 kilometres per hour, as Mr. Mehta would have us suppose.

Admittedly, these aircraft are faster than any operated by Imperial Airways, but it is surely only a question of the incidence of fleet replacement. If one can judge correctly from the Press, the British programme of carrying all first-class mail by air in 1937 will necessitate an entirely new fleet of aircraft. This new generation will be on the routes before the K.L.M. Douglases have obsolesced, and the pendulum of comparison will have swung in the opposite direction. Then, no doubt, the K.L.M. will produce—or more likely purchase from America—something a little better, and so the struggle for supremacy goes on.

There seems to be a national characteristic to decry our own institutions, especially enterprise in any way Government controlled, but if we must do this a truer picture is frequently obtainable by analysing facts instead of drawing inferences from an inaccurate or misquoted newspaper report.

London, S.W.3.

K. GRANT.

## STANDARDISED PERFORMANCE FIGURES

[3047] Everybody who has to deal with performances will sympathise with Lt. Cdr. Colson's plea, in an article in *Flight* of May 23, for standardised methods of expressing aircraft performances.

There are certain difficulties in the way, unfortunately. Take cruising speed; it is not permitted to run engines at more than normal r.p.m. continuously, hence cruising speed has a maximum limit at normal r.p.m. It is usual to design airscrews to allow of reaching maximum permissible r.p.m. at maximum speed, thus the maximum possible cruising speed bears a ratio to the maximum level speed, substantially the same as the ratio between maximum permissible and normal r.p.m.

In some engines maximum r.p.m. are 10 per cent., in others 15 per cent., above normal, and variation between engines accounts for one difficulty in standardising what is meant by cruising speed.

If the range between maximum and normal r.p.m. is 10 per cent., then cruising speed at normal r.p.m. at the full-power height of the engine requires approximately 75 per cent. of maximum horsepower. If the range is 15 per cent., then maximum cruising speed requires only approximately 65 per cent. of maximum h.p.

Now sometimes 75 per cent. maximum power is more than the engine maker likes to have taken from his engine continuously, or than the operator finds conducive to an adequately low maintenance expenditure. But this refers only to maximum possible cruising speed with a normal airscrew. It is possible to use a heavy airscrew and take more power than indicated above at normal r.p.m., thus pushing up cruising speed. This is not done because it takes too much from the engine.

It is also possible to use a light airscrew to give more than maximum permissible r.p.m. at top speed—in which case it is not permitted to fly at top speed, which is of no importance—but it becomes possible to take more power from the engine at take-off and on climb. This, however, reduces the maxi-

mum cruising speed at normal r.p.m. This may be done when climb and take-off conditions are difficult.

But so far I have considered only maximum possible cruising speed. Below that speed, and down approximately to speed giving the maximum L/D ratio for the aircraft, is a whole range of possible cruising speeds in which a reduction in speed leads to a decrease in fuel consumption per mile.

Actually it is indicated air speed which determines fuel consumption per mile, and not true speed. This is not absolutely true, but for practical purposes the range of a given machine depends only on A.S.I., and true speed for a given range as altitude increases, so that a machine which has a range of 500 miles at sea level at 150 m.p.h. has the same range at 162 m.p.h. at 5,000 ft., and at 175 m.p.h. at 10,000 ft., assuming that all these speeds are possible within the engine limit of normal r.p.m.

It is thus apparent that "cruising speed" is a term which has no real meaning, and has no real interest even to the operator, unless all the other conditions accompanying it are specified.

One and the same machine may most economically be operated at 85 per cent. of maximum speed at full power height of its engines, when a moderate range only is required and speed is important. If, however, it is essential that a considerably greater range shall be covered non-stop than is possible at this speed, the machine may be cruised at, say, 65 per cent. of its maximum indicated speed. This does not necessarily mean at 65 per cent. of its maximum true speed, since it will be possible at the reduced air speed to fly considerably higher, and thus increase the true speed to something approaching the maximum possible cruising speed, though it will never be possible quite to reach that maximum possible.

The question of which of the many possible cruising conditions should be used in given circumstances is governed by a variety of considerations, and since the only reason for publishing performance figures generally is the hope of interesting buyers, the maker almost invariably chooses for publication cruising speed conditions which exhibit the machine in the most favourable light.

There is no real difficulty in showing very completely the real range of performance of any given aeroplane by means of curves which, for instance, will show range, true cruising speed and operational height, together with proportion of engine power used under each condition, but experience shows that the average business man—who is the person to whom, unfortunately, one has to sell aeroplanes—can't or won't understand anything except slogans and headlines, and intensely dislikes words of more than two syllables (unless, of course, he uses them himself).

London.

PERFORMANCE WALLAH.

## FINCHLEY

[3048] Your "Outlook" paragraph in *Flight* of May 23 entitled "Strange Thinking" certainly lives up to its name. It is very strange thinking indeed.

Presuming, reasonably enough, that all opinions are honest opinions, then it is surely a little unkind of you to assume, by inference, that the people who disagree with you are not "decent minded"—whatever that may mean.

Furthermore, your police analogy simply does not work. Separate households do not own their own private policemen to defend their severally demanded "rights," nor do our police arrange mock executions in public to encourage law-mindedness among school children.

I consider that the very excellent R.A.F. Display can do little harm to anyone—but that is a matter for each of us to decide. As the children cannot decide what is good for their "sub-conscious," the Finchley Education Committee have necessarily had to decide for them.

Finchley.

A.G.H.

## IN BRIEF

Mr. Philip Downie, 41, Fitzherbert Avenue, Palmerston North, New Zealand, is anxious to correspond with enthusiasts in Britain, and to exchange aeronautical photographs, magazines, and New Zealand Jubilee stamps.



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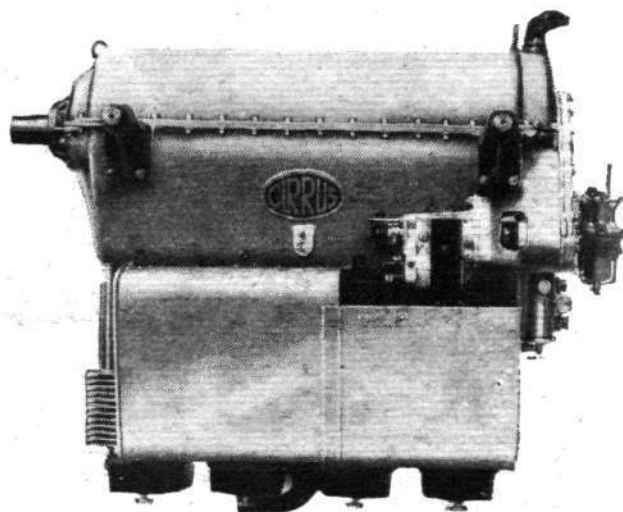
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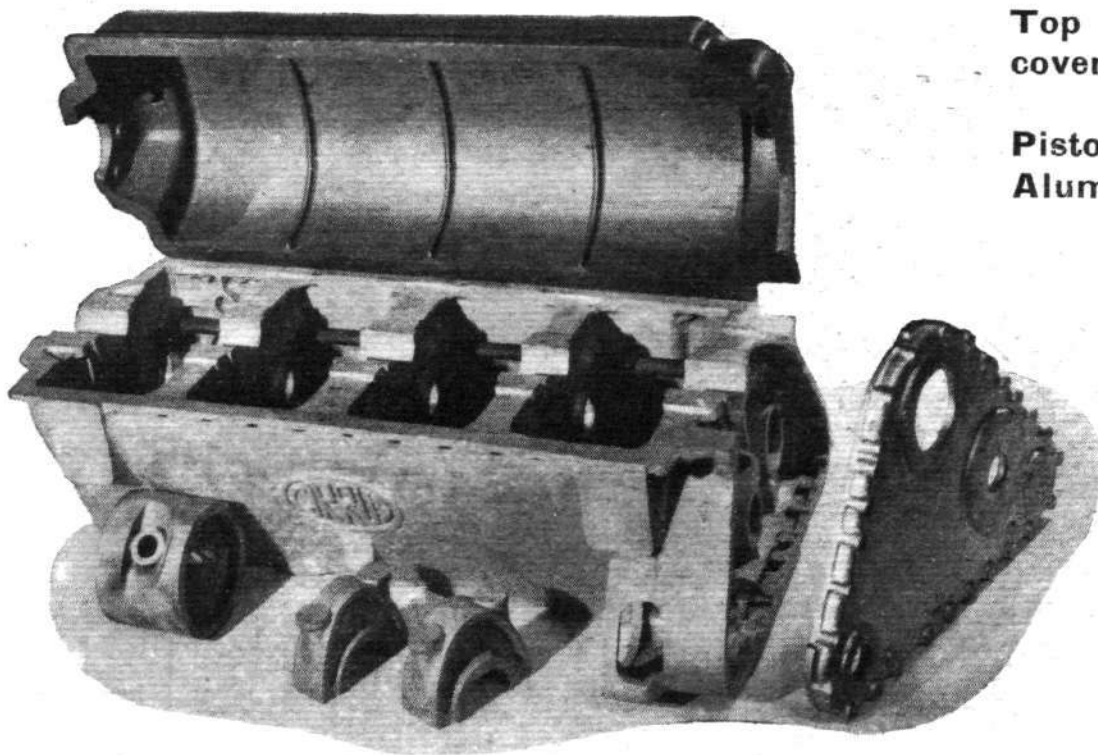
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# THE "CIRRUS MAJOR"

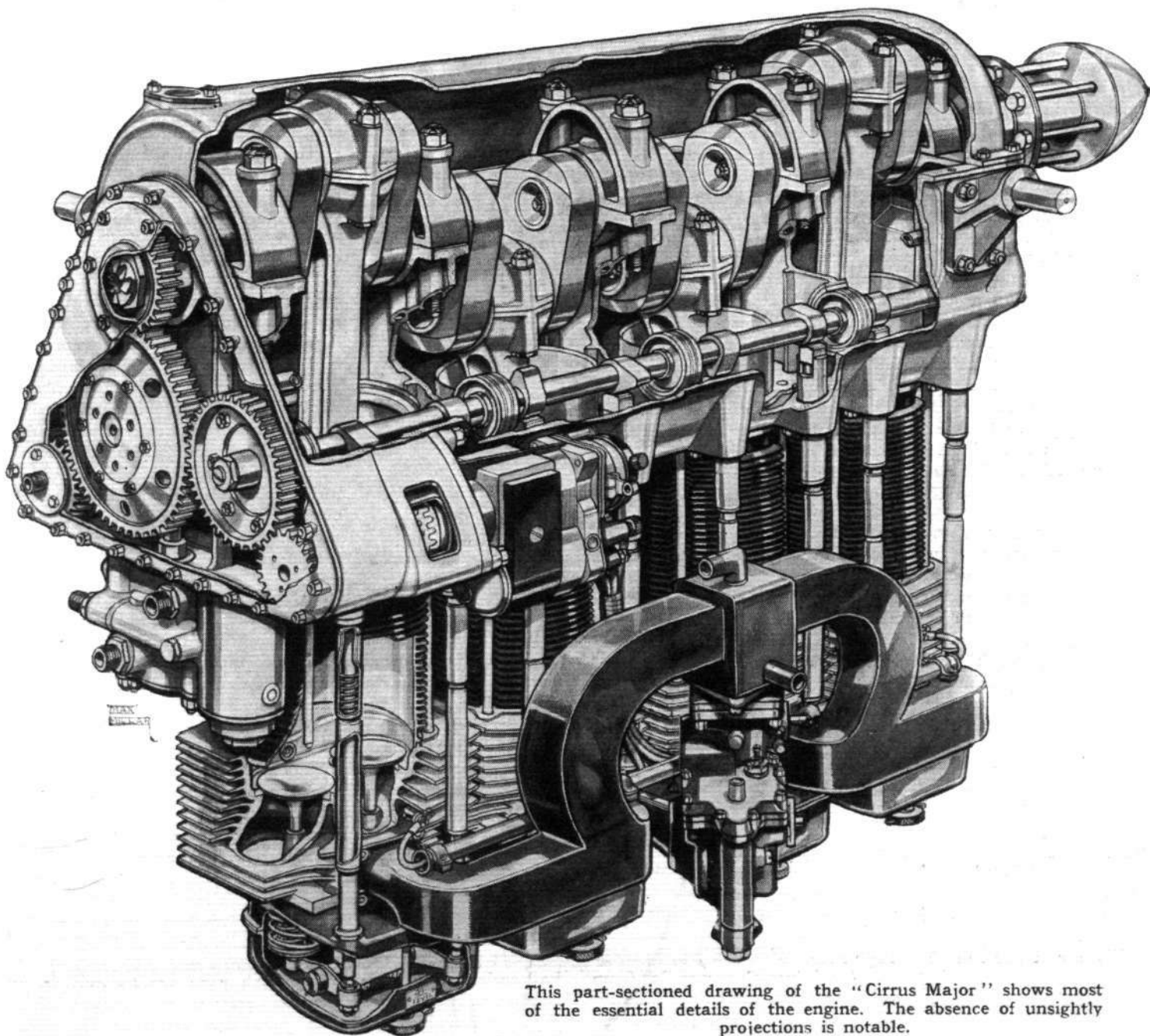
*Many Practical Detail Improvements in Latest Product of the Cirrus-Hermes Company : 125 b.h.p. at 2,100 r.p.m. : Robustness and Reliability the Designer's Chief Aims*

**M**ORE than eleven years have passed since the first "Cirrus" aero engine was produced. The first reference to it occurred in *Flight* of February 5th, 1925, in a paragraph dealing with the then new D.H.60 "Moth" light aeroplane.

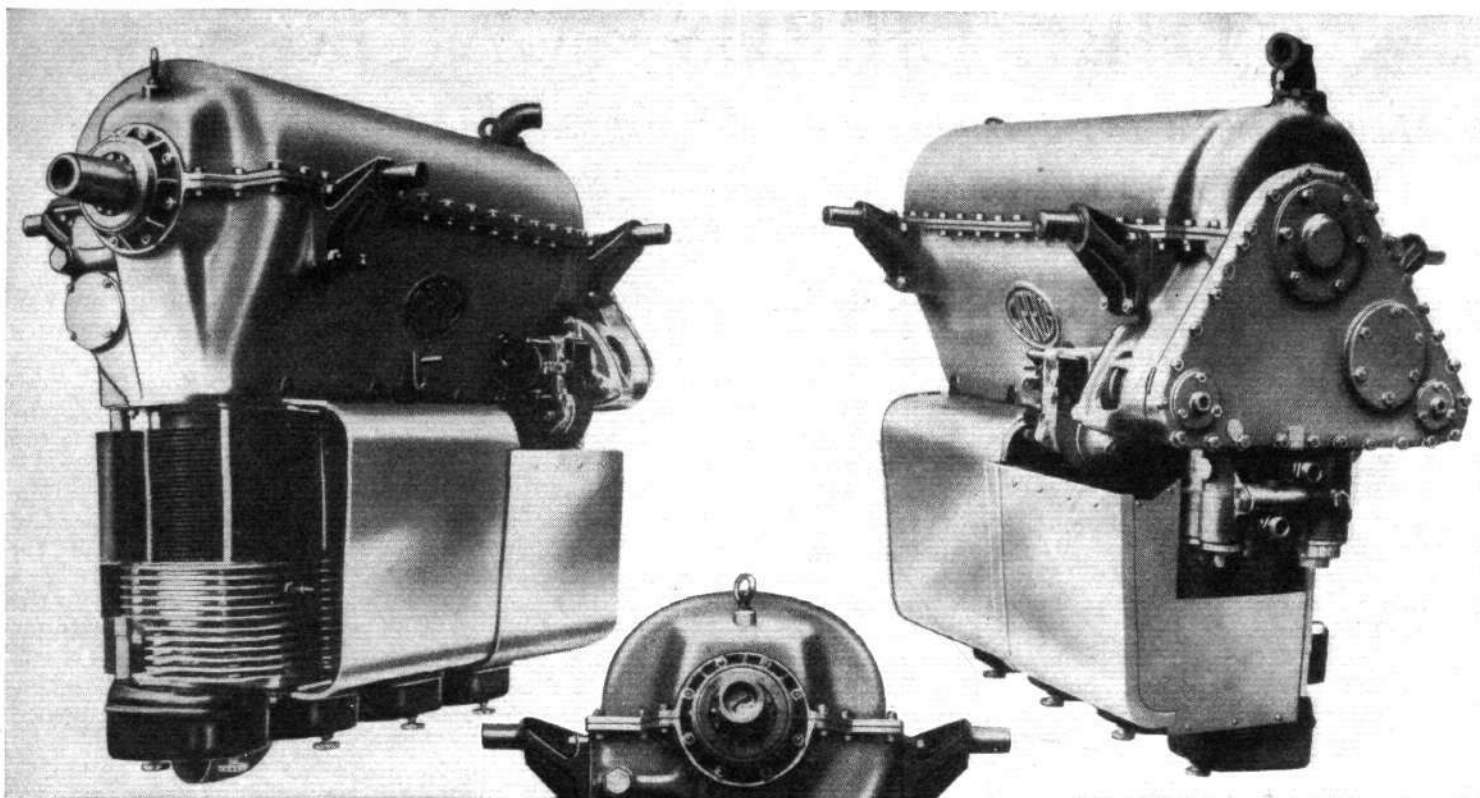
From the first "Cirrus," of 60 b.h.p. at 1,800 r.p.m., to the "Cirrus Major" now introduced by the Cirrus-Hermes Engineering Co., Ltd., of Brough, Yorks, is a far cry, and the whole accumulated experience of engine design, manufacture and operation has been incorporated in the latest product of the company. Mr. C. S. Napier, the designer of the engine and a director of the company, has made full use of all the experience which the operation of very large numbers of "Cirrus" engines of different models has made available, and although the "Cirrus Major" is an entirely new engine, such features as have

been found to stand the test of time have been retained, while others which modern development has shown to be desirable have been incorporated. It may thus be taken for granted that there is nothing of an experimental nature in the new engine, which can, in fact, be regarded as the logical outcome of an experience covering more than ten years of flying in all parts of the world.

Basically, the "Cirrus Major" is a four-cylinder-in-line inverted air-cooled engine, rated at a normal power of 125 b.h.p. at 2,100 r.p.m., and weighing 130 lb., or 2.48 lb./h.p. Robustness and great reliability have been aimed at rather than ultra-light weight. The fact that direct drive to the airscrew is employed has necessitated relatively low speed in order to obtain good airscrew efficiency and, through that, good thrust horse-power. The simplicity of the general design should appeal to the owner,



This part-sectioned drawing of the "Cirrus Major" shows most of the essential details of the engine. The absence of unsightly projections is notable.



be he a private individual or a commercial operator, not to mention the ground engineer, whose work should be comparatively light during the long periods between overhauls. Beyond normal maintenance and routine inspection there should be very little for an engineer to attend to.

The inversion of the new engine has necessitated a new lubrication system. From the illustrations can be seen the arrangement of the oil pump and filter casting at the rear of the engine, and, except for the oil-feed pipe from the tank and the return pipe to the tank, there are no other external oil connections. The oil is forced by the pump along a gallery pipe running through the walls of the crank case and feeds the main bearings through passages in the supporting webs. The crank case itself is of new design, with a very strong nose end which carries a special oil seal on the crankshaft. Hooks are provided for slinging the engine.

Following usual "Cirrus" practice, the timing-gear cover is a simple one and does not disturb any gears when removed.

The cylinders are of composite construction, with steel barrels and light-metal detachable heads. The cylinder barrels are machined all over from high-grade steel forgings, made by G. Turton Platts and Co., and are located on the crank case by spigots and held down by long bolts which also secure the cylinder heads. The latter are manufactured of Hiduminium alloy and are based upon the type of head used so successfully on the "Hermes IV A" engine. The fins are of large dimensions to give ample cooling area. A gas-tight joint is obtained by Dermatine laminated copper washers.

Pistons of the full skirt type are used. They are manufactured by the Birmingham Aluminium Castings Co. from heat-treated "Y" alloy, and each carries four Wellworthy piston rings, two compression and two scraper rings. The

Three views of the "Cirrus Major": The small frontal area is well shown in the front view, while the three-quarter front and three-quarter rear views show the exhaust side of the engine.

gudgeon pin is of the fully floating type, located by a circlip at each end.

Hiduminium forgings of large section are used for the connecting rods. They are fitted with white metal-lined steel shells, which are ground to ensure a perfect fit in the big ends.

The main crank case, as already mentioned, is of very clean design; it is an aluminium casting manufactured by the Birmingham Aluminium Castings Co., who also supplies the crank case cover, which is a shallow Elektron casting, with a breather cast integrally at the rear end. All gears are carried in the crank case, and are not disturbed when the timing cover is removed.

A high-quality Laystall steel forging is used for the crankshaft, which is carried in five Glacier die-cast bearings located in sub-

stantial main bearing caps. A Hoffmann journal ball bearing is fitted at the front end to take care of the airscrew thrust. The crankshaft has a "foreshortened" nose end, which permits of a new design of airscrew boss to facilitate the removal of the airscrew. A dog is fitted at the rear end for starting. The camshaft, by the Weyburn Engineering Co., is driven by a simple train of spur gears and is carried in five bronze bearings fitted in the crank case. The rear end has a tongue for any auxiliary drive which may be required, such as for oil pumps, etc.

Valves made of Kayser Ellison K.E.965 steel are used, the inlet and exhaust valves being identical and interchangeable, and fitted with concentric coil springs made by George Salter and Co., Ltd. A hardened tip is fitted to the end of the stem and is replaceable. The valves are operated from the camshaft by one-piece cup-ended tappets (which pass through phosphor-bronze guides) and ball-ended push rods. The push rods are located in an easily adjustable cup in the end of the rocker arms, while renewable hardened pads are fitted at the other



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"HERMES IV"  
"HERMES IV<sub>A</sub>"  
"MINOR"

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# CIRRUS "MAJOR"

*is fitted exclusively*

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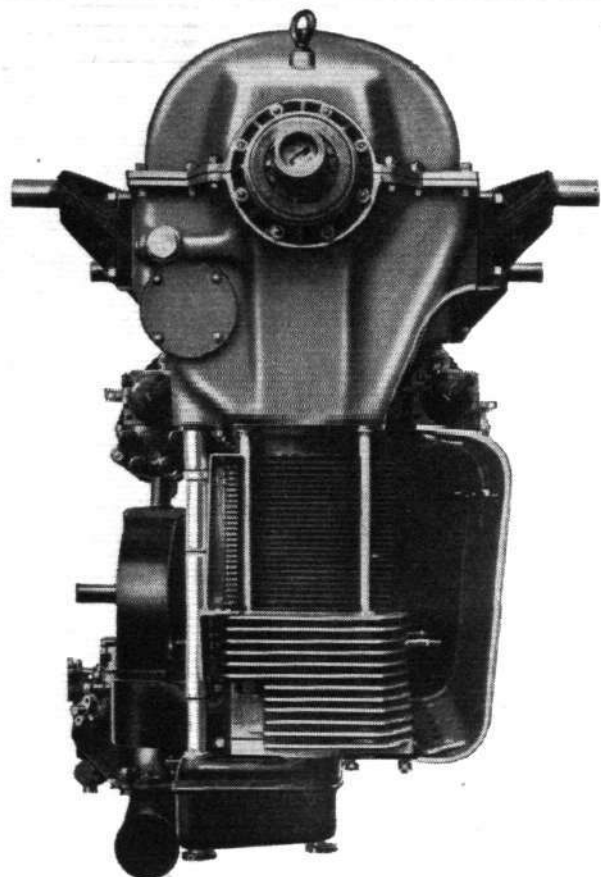
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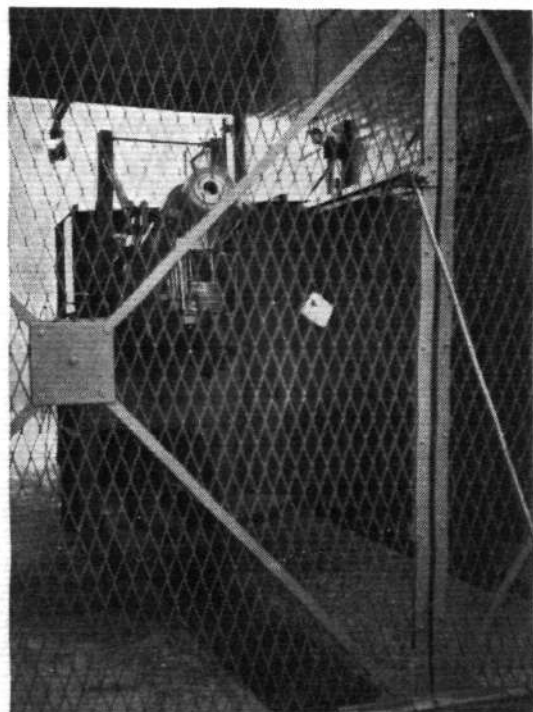
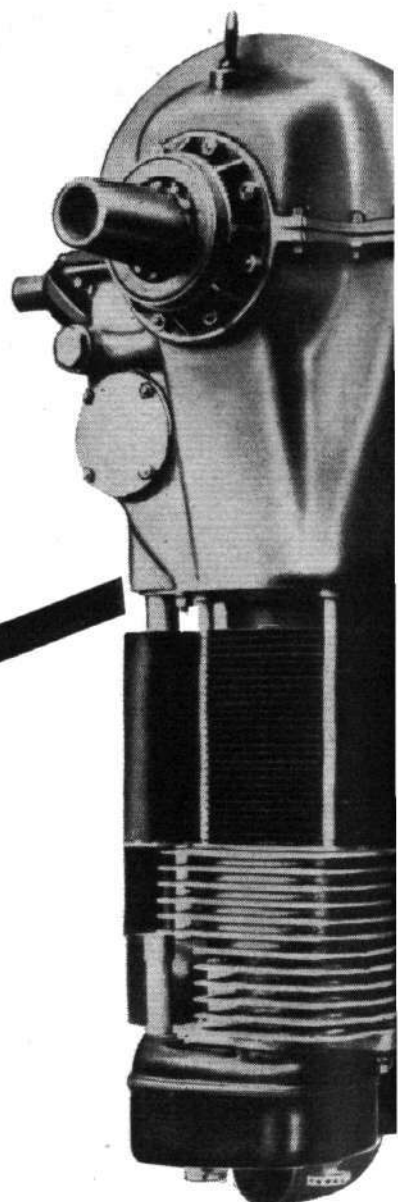


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We have pleasure in announcing the 125/135 May 30th and deliveries will commence July 125 h.p. at 2,100 r.p.m. (normal). 135 h.p. at 2,100 r.p.m. Oil consumption 1 pint per hour, etc., approx. 310 lbs.

Our works are well equipped with every facility and workmanship are embodied in these engines.

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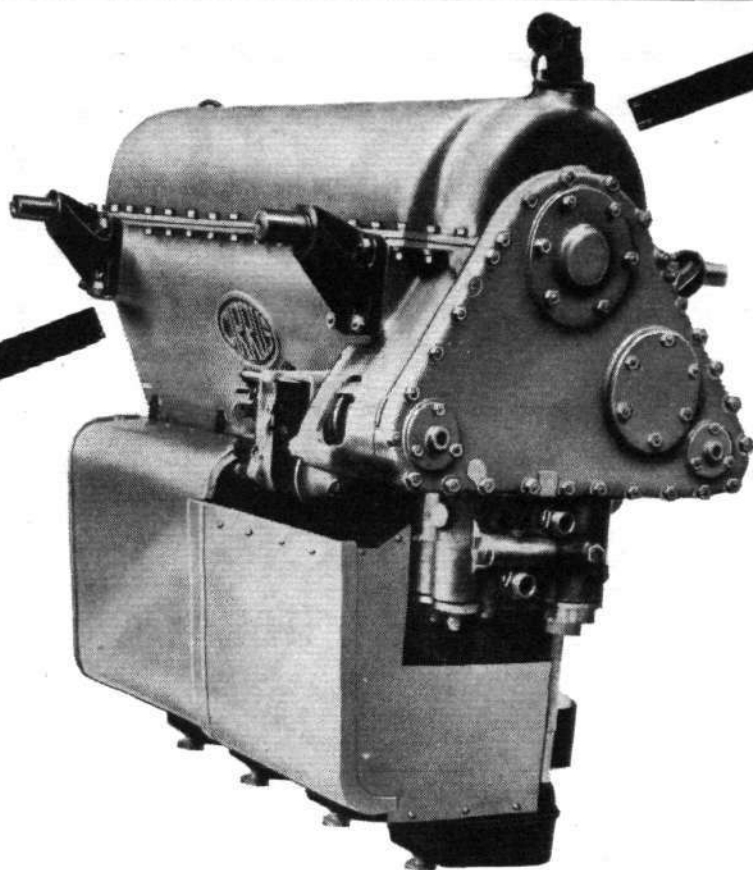
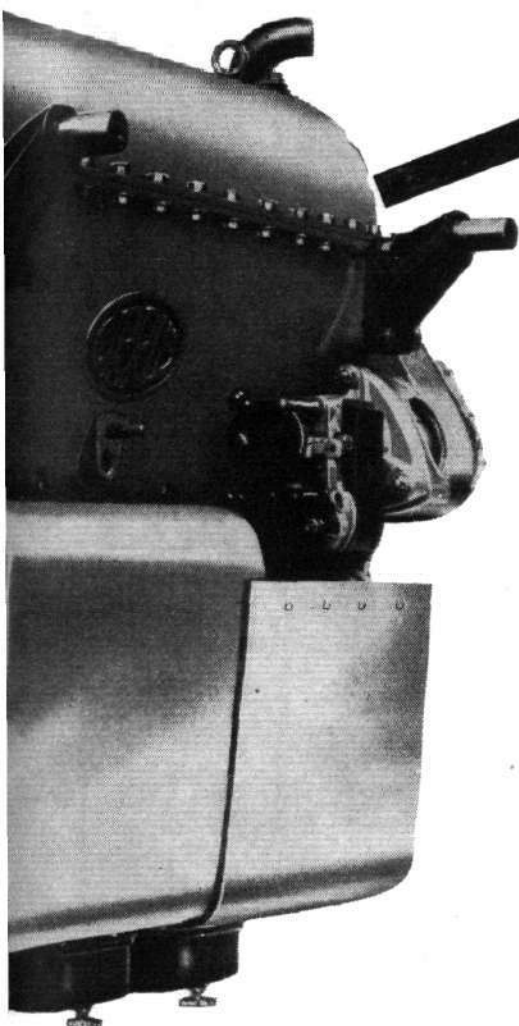
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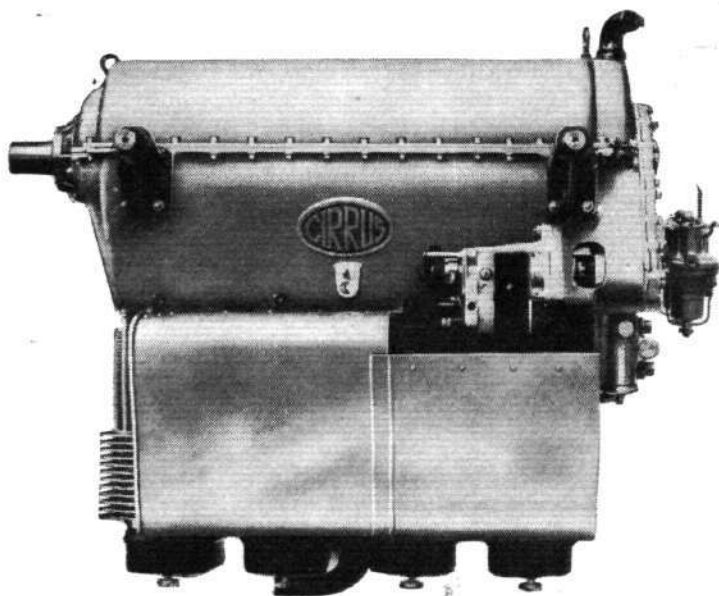
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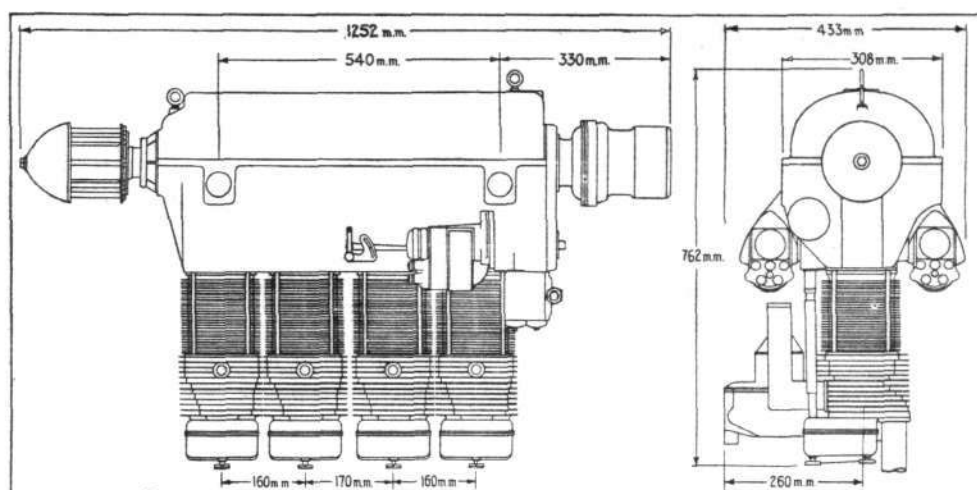
end, which makes contact with the valves. Rocker covers by J. Stone and Co. enclose the "underhead" valve gear and ensure that no loose oil escapes.

A Claudel Hobson AV.48D carburetter is fitted, and distributes mixture to the four cylinders via a square-section induction pipe. It is provided with an independent altitude control.

Ignition is provided by two B.T.H. spigot-type magnetos, each firing four K.L.G. type V.12/1 sparking plugs. One of the magnetos is provided with an impulse starter. The usual Simms vernier rubber couplings are fitted. Weston oil seals for the magneto drives are provided.

The oil pump, by Magnesium Castings and Products, is of the oscillating piston type, and has been specially designed for the "Cirrus Major" engine. It is considered that this type possesses advantages over the gear type of pump, particularly where the oil tank is situated some distance below the engine, as it is capable of working with a greater lift. The suction and pressure pumps and filters are all housed in one casting at the rear of the crank case, direct connection being made to the oil ducts in the casting without the aid of external pipes. The removal of the filters for cleaning purposes is thus a very simple matter.

Resilient-type bearer feet are supplied, and it might be pointed out that the width between centres can be adjusted by using different types of feet. Distances are, of course, taken from the bolts of the stirrups which house



Installation diagram of the "Cirrus Major"; the width between bearer centres is adjustable.

the "Silentblocs," and into which the metal bearer feet are fitted.

All "Cirrus Major" engines are supplied complete with induction manifold, carburetter, two magnetos, eight sparking plugs, propeller boss and spinner, resilient bearer feet, "Silentblocs" and stirrups for them, cylinder cooling chutes and baffles, oil pumps and filters, engine controls, and tool kit for running adjustments. All engines are "motored-in" before being tested under their own power. This is done by electric power, and during the motoring period the engines are copiously supplied with oil, which is passed through special filters.

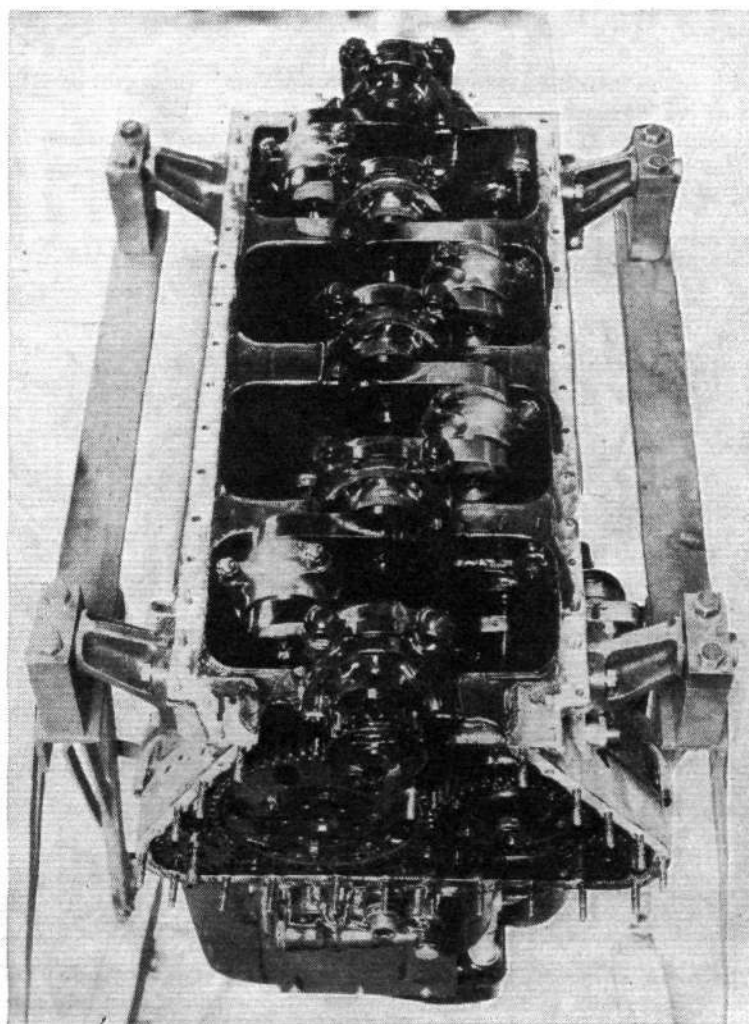
The new "Cirrus Major," and its "brothers," the "Minor" and the "Hermes IV A," start with a very definite advantage in that they are being manufactured

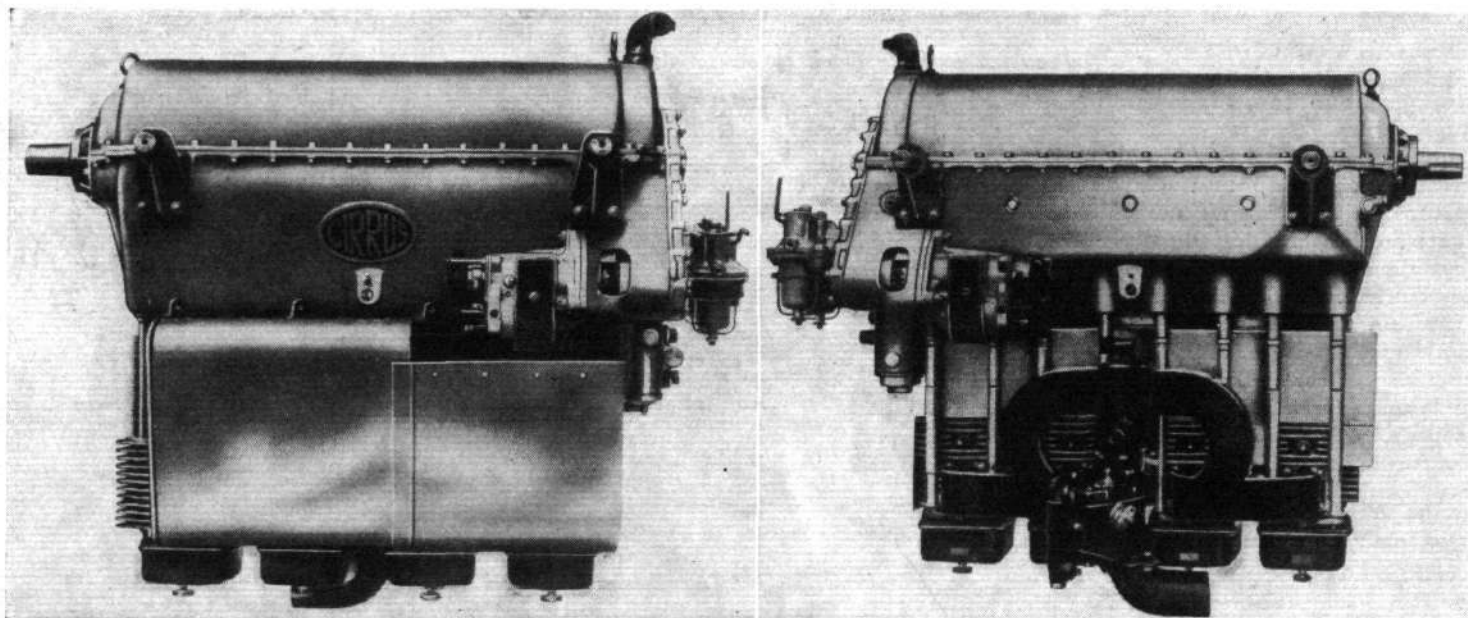
### THE "CIRRUS MAJOR" ENGINE

TYPE: Four-cylinder, in-line inverted air-cooled.  
 DIRECTION OF ROTATION: Left-hand Tractor.  
 BORE: 120 mm (4.72in.).  
 STROKE: 140 mm (5.51in.).  
 SWEEP VOLUME: 6.33 litres (386.28 cu. in.).  
 COMPRESSION RATIO: 5.1:1.  
 NORMAL B.H.P.: 125 at 2,100 r.p.m.  
 MAXIMUM B.H.P.: 135 at 2,350 r.p.m.  
 CRUISING REVS.: 2,100 r.p.m.  
 \*WEIGHT COMPLETE: 310 lb. (140.6 kg).  
 FUEL CONSUMPTION: 0.54 pt./b.h.p./hr. at normal r.p.m.  
 " " : 0.58 pt./b.h.p./hr. at max. r.p.m.  
 OIL CONSUMPTION: 1 pint per hour.  
 OIL PRESSURE: 40-60 lb./sq. in. (15 lb./sq. in. minimum).  
 OIL IN CIRCULATION: 0.75 gal. minimum.  
 HEAD OF PETROL REQUIRED: 2-12ft. (or 1 lb./sq. in. min., 5 lb./sq. in. max.).  
 LENGTH (incl. starter and spinner): 1252 mm (49.22in.).  
 HEIGHT AT FRONT: 720 mm (28.35in.).  
 HEIGHT AT REAR: 762 mm (29.95in.).  
 GREATEST WIDTH: 459 mm (18.1in.).  
 BEARER FEET CENTRES LENGTH: 540 mm (21.26in.).  
 (Width between bearer feet centres adjustable.)

\* The weight complete includes magnetos, carburetter, airscrew boss and spinner, resilient bearer feet, Silentblocs and stirrups, engine controls, side cooling chute and baffles, oil pumps and filters, and is subject to a variation of  $\pm 5$  lb.

(Right) With crank case cover removed. The "Cirrus Major" on a test bed, tilted in order the better to show the details. Note the grouping of the drives at the back.



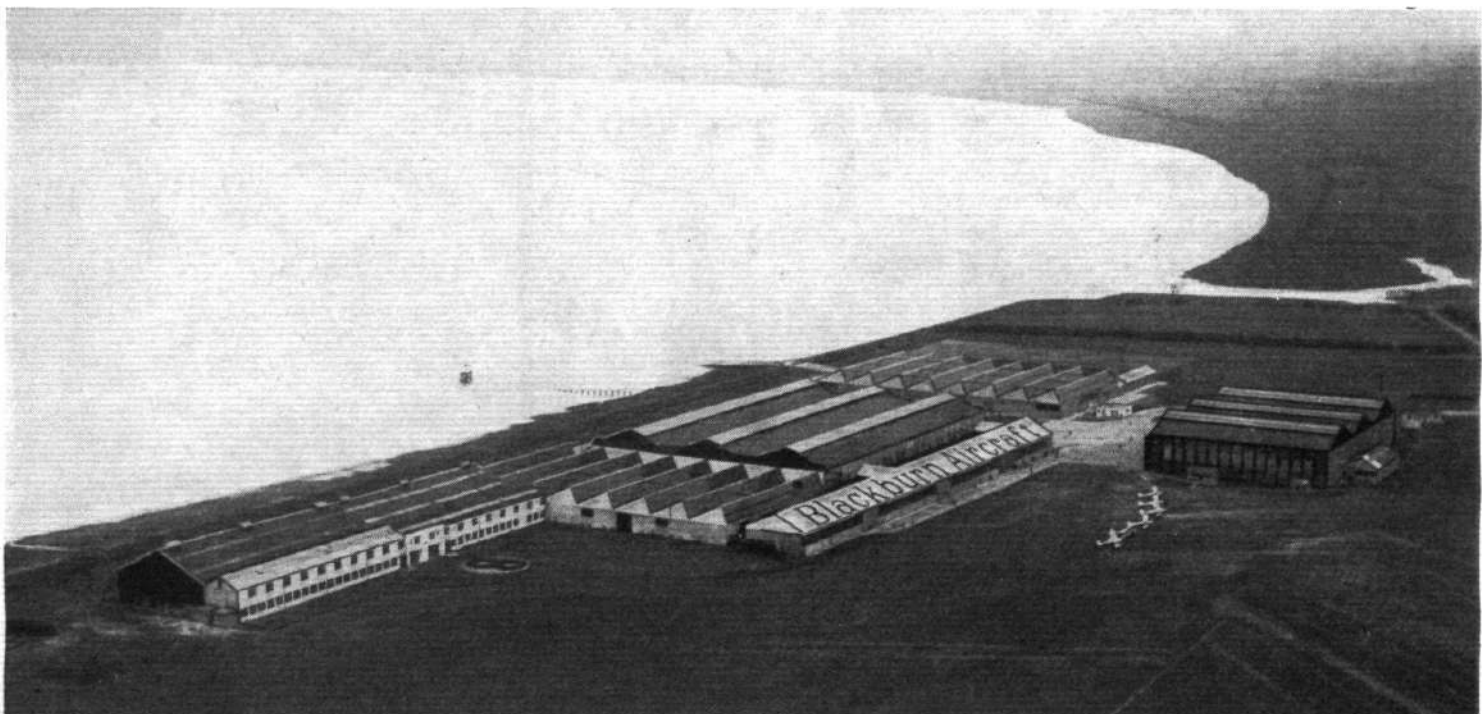


These side views of the "Cirrus Major" show the cooling chutes on the exhaust side and the induction manifold, etc., on the inlet side.

in newly built works by absolutely new and up-to-date machinery. We believe we are right in saying that not a single machine in the Brough factory was bought second-hand. The works themselves are connected to the engine test houses by overhead railways for conveying the engines to the test beds, of which there are seven, in separate brick buildings housing the well-known Heenan and Froude dynamometers or, in some cases, brakes with calibrated propellers. The testing equipment includes adjustable test beds, which can be tilted to represent climbing and diving flight. In this way tests are made to disclose whether such things as lubrication and carburation are satisfactory with the engine tilted at large angles.

With the introduction of the "Cirrus Major" the makers' range of engines now includes three types: the 70 h.p. "Cirrus Minor" (described in *Flight* of February 28), the "Hermes IV A" of 120 h.p., and the "Cirrus Major" of 125 h.p. Readers will remember that some time ago the

Cirrus-Hermes Engineering Co., Ltd., was reorganised, Mr. Robert Blackburn, the well-known pioneer and managing director of the Blackburn Aeroplane and Motor Co., Ltd., of Brough, East Yorkshire, interesting himself in the company. With his co-directors, Messrs. R. Rhodes, C. S. Napier and E. S. Olney, Mr. Blackburn plans to pursue a vigorous policy, and it may be expected that after the lull which inevitably accompanied the transfer of the works from Croydon to Brough, where large works, as already mentioned, have been built specially for the construction of "Cirrus" engines, a good deal will be heard of these engines in the future. Already, we gather, the first batch of "Cirrus Majors" has been allocated, while quite a number of the second batch are earmarked. The type tests have been satisfactorily completed, and it is expected that deliveries will be commenced at the end of this month. The fact that the King's Cup Race is not to be held until September should enable some "Cirrus Majors" to take part.

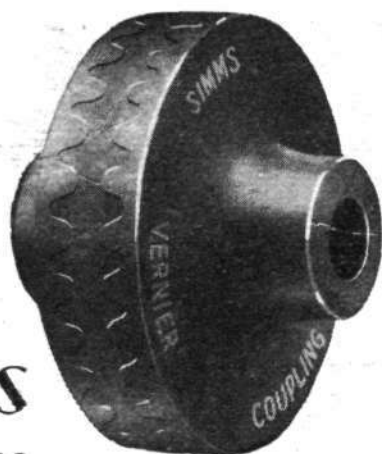


The home of the "Cirrus Major": An aerial view of Brough, with the Blackburn aerodrome and works in the foreground. The works of the Cirrus-Hermes Engineering Co., Ltd., are those farthest from the camera. (*Flight* photograph.)





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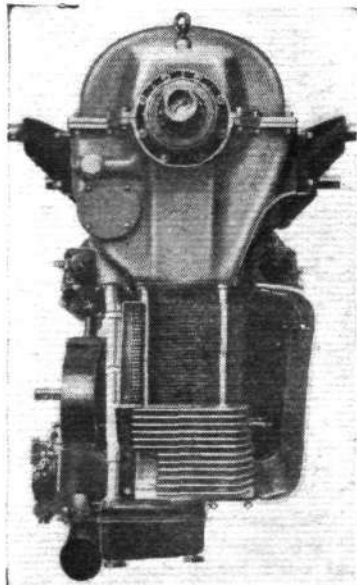
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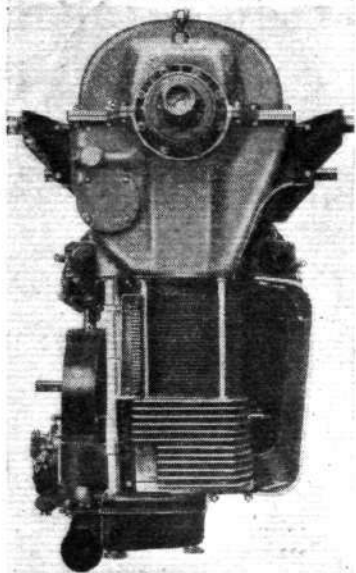


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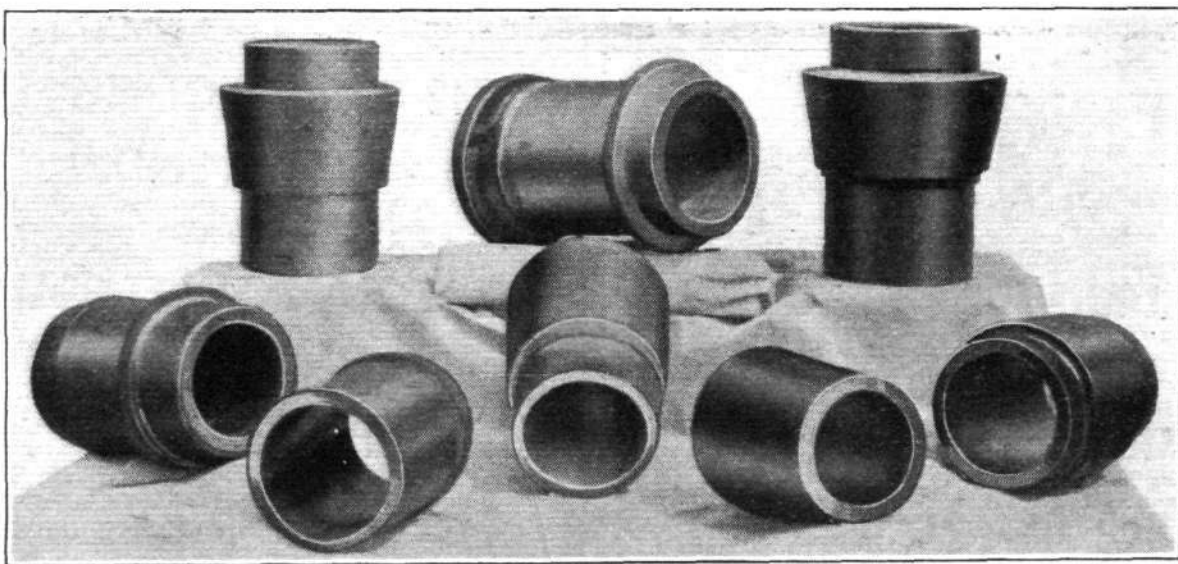
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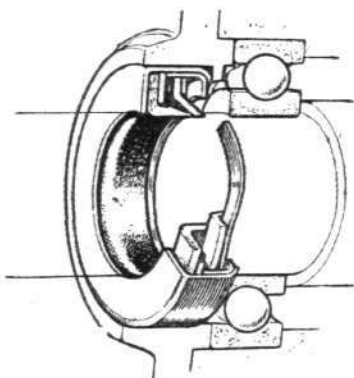


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# RESEARCH at the N.P.L.

## Matters of Aeronautical Interest in the Laboratory's Annual Report

**T**HERE is much of interest to the aeronautical engineer in the Annual Report of the National Physical Laboratory for the year 1934, which was recently issued (published by H.M. Stationery Office, price 13s. net). Although the report deals with the work of the N.P.L. as a whole, and not specifically with those sections which carry out research in connection with aviation, there are several reports devoted to the latter, as the following outline indicates:—

### AERODYNAMICS DEPARTMENT

**A New Biplane Arrangement.**—Experiments were made on an arrangement of biplane wings expected to give improved stability at the stall. The form adopted was that shown in the adjacent diagram. Experiments were made with the upper plane set at various fore and aft positions relative to the lower plane, and the gap at the wing tips was altered by changing the dihedral angle of the lower plane. A few experiments were made in which the lower wing was fitted with ordinary unbalanced ailerons, and aileron control was found to be about normal below the stall but falling off less than normally at angles of incidence in the region of the usual stall. At the same time the usual adverse yawing moment was found to be smaller in this region.

Maximum lift/drag ratio compared well with that for an ordinary biplane after making due allowance for the difference in aspect ratio and mean gap. At the higher incidences the new biplane gave lower values of  $L/D$  than did the ordinary biplane, an advantage in that it would make possible a steepened gliding angle for coming in to land.

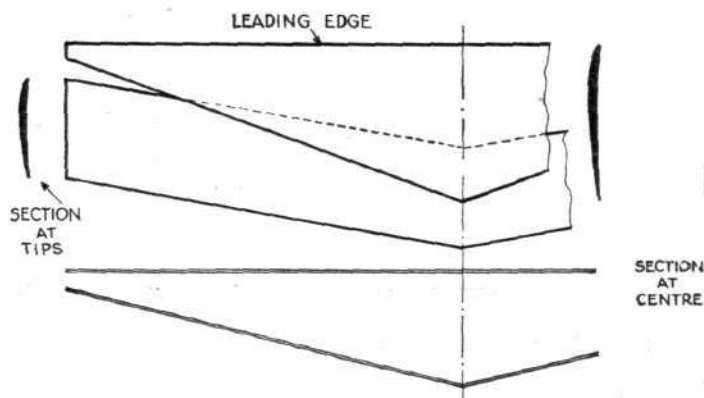
The new biplane was found to be stable in roll at angles of incidence up to 40 deg., the degree of stability gradually decreasing as the incidence increased, but still remaining appreciable at 40 deg. Spinning did not appear to be ruled out, but it is thought that there would probably be reluctance to enter a spin.

A premature stall was found to occur, starting at the extreme tips of the upper wing and gradually spreading inwards until, at about 16 deg. incidence, the upper wing was completely stalled. The lower wing did not begin to stall until about 24 deg. incidence, when it started at the centre and gradually spread towards the tips. The wing section used was R.A.F.15.

### The Compressed-Air Tunnel

**Researches in the Compressed-Air Tunnel.**—The compressed-air tunnel enables models to be tested in a stream of air compressed at many times the ordinary atmospheric pressure, and it can be proved that tests on a small model in this tunnel can be made to give results directly applicable to a full-sized aeroplane.

During the first full year's working of the tunnel many valuable and interesting results have been obtained, particularly with respect to the behaviour of wings of various kinds. In the first place, much more detailed knowledge has been obtained with regard to the maximum lifting force that a wing can give. This quantity is of fundamental importance to the designer, since it determines the slowest speed at which an aeroplane can fly, or, in other words, the landing speed. It was previously known that higher lifts could often be obtained in flight than those indicated by model tests in an ordinary wind tunnel. The compressed-air tunnel has enabled these changes to be fully explored, and has provided more reliable measurements of maximum lift than were previously available. Comparison with tests in actual flight has confirmed that the tunnel is giving the correct full-scale results. In the second place, measurements of "drag" or head resistance on wings and on complete model aeroplanes have confirmed the considerable reduction which occurs between the condition of a normal model test in an atmospheric tunnel and that of the full scale machine, and have given much more detailed information about its magnitude. The tests on smooth wings have emphasised the extreme importance of making all surfaces on aeroplanes as smooth as possible if high speeds are required.



This new biplane arrangement (described in the adjacent column) has formed the subject of some interesting National Physical Laboratory experiments

**Aircrew Research.**—The increasing speeds of modern aircraft have naturally led to the use of airscrews of high pitch, and the lack of data on such screws has led to the inauguration of a long research. Work done some years ago on a family of airscrews has been partially repeated and extended to very much higher pitch values. Concurrently, existing airscrew theories have been elaborated to cover the new conditions, and their predictions compared with the experimental results. The more elaborate theory gives excellent agreement with experiment, but was more difficult to apply in design. It has now been reduced to a practical design method by the use of a series of charts, and can be used with no more labour than the earlier and simpler theory involved.

**Effects of Gusts on Stresses in Aeroplane Structures.**—Research on this subject has followed two main lines. Calculations have been made of the stresses in the wing structure when an aeroplane flies through wind gusts of various assumed characteristics. These calculations are of great complexity, since the effects depend on at least four different factors, viz., the nature of the gust, the stability of the aeroplane, the rate at which a change of velocity produces the equivalent change of lift, and the flexibility of the wings. The second line of investigation concerns the measurement of actual gusts, in order to provide data for use in the calculations. For this purpose special instruments have been designed to record the vertical and horizontal velocity variations which occur in a natural wind. These will, of course, only allow such gusts to be measured near the ground, say, up to 800ft. as a maximum, as the instruments must be mounted on a fixed tower, but even with this limitation their use should greatly increase our knowledge, as present data on gusts is extremely meagre. At greater heights the study can only be pursued by observation of overall effects on machines in flight by the use of recording accelerometers. This method has been used effectively at the Royal Aircraft Establishment, and air lines are being encouraged to carry such instruments, so as to collect representative data on the accelerations due to gusts over as wide a geographical range as possible.

### Investigating Flutter Problems

**Flutter Problems.**—Some time ago very definite recommendations were made on the subject of flutter prevention, and one of them, viz., the mass balancing of control surfaces, has been almost universally adopted. The present tendency towards greatly increased speeds of flight has, however, brought the subject of flutter again into prominence. At these high speeds mass balance may not be sufficient, or may be impossible to carry out with sufficient accuracy to guarantee the complete elimination of trouble from flutter. Moreover, says the report, the recent investigation on the accidents to the "Puss Moth" has indicated that, at any rate in some types of construction, the motions involved in flutter may be more complex than those taken into account in the earlier work. This has led to an extension of the earlier work to cover the later conditions and to take account of certain effects neglected before, such as solid friction in the control

system, and non-linearity of control-hinge moments. Investigations are also in hand on the flutter of servo-control and servo-balanced systems, and on the flutter of airscrew blades.

#### METALLURGY DEPARTMENT.

**Magnesium Alloys.**—Magnesium alloys are being investigated for the Metallurgy Research Board as part of the programme of research on light alloys for the Aeronautical Research Committee. The object is to develop light alloys stronger than those at present available, for use both at ordinary and elevated temperatures. There is a demand among aircraft constructors for improved magnesium alloys.

Particular attention is being given to the discovery of metals which are soluble in solid magnesium, and which are more soluble at elevated than at ordinary temperatures, so that the strength of the alloys can be improved by heat-treatment. This involves the study of microstructure and constitution, as well as of rolling and mechanical properties. This work is made more difficult because magnesium alloys cannot readily be forged and rolled. For this reason it has been necessary to evolve methods of hot-working the cast metal. Special attention has been given to the effect of slow pressing, and it has been found possible to work by this means alloys which are difficult or impossible to roll satisfactorily. In some cases material which has first been pressed can then be rolled more easily. Investigation of the mechanical and working properties of magnesium-cadmium-zinc and magnesium-cadmium-aluminium alloys has been continued, and an intensive study has been made of an alloy containing 8 per cent. cadmium and 8 per cent. aluminium. A paper describing results of this work has recently been published by the Institute of Metals.

#### ENGINEERING DEPARTMENT

**Fatigue Under Combined Stresses.**—The new N.P.L. combined-stress fatigue-testing machines have been continuously employed on a comprehensive investigation of the strength of metals under combined alternating stresses, the main objects of the work being the determination of the stress criterion which produces failure, and the provision of

design data for such important engineering components as engine crankshafts.

The fatigue resistance has been determined of three materials, viz., (I) 0.1 per cent. carbon steel, (II)  $3\frac{1}{2}$  per cent. nickel-chromium steel, and (III) "Sisal" cast iron, representing two ductile steels of different types and a "brittle" material. For each material the fatigue resistance has been determined under reversed plane bending and reversed torsional stresses, and under five combinations of these types of stressing actions. The results of the tests show that the fatigue limits of cast iron are in close accordance with the criterion of Maximum Principal Stress; the results obtained on the two steels show that the fatigue limits of these ductile metals can be expressed by a simple relation of a general form.

**Strength of Thin Sheet-metal Panels.**—When thin sheet material is loaded by compressive or shearing forces in the plane of the sheet, the relation between the load and the deformation may be very much affected by the occurrence of buckling. Thus, in the case of a plane rectangular panel of thin sheet material having all its edges supported, and loaded in compression parallel to one pair of edges, buckling will cause an immediate reduction of the stiffness to one-third of the stiffness before buckling, and further increase of load will cause a further reduction.

Tests on curved panels carried out at the Laboratory have shown that in this case also buckling causes an immediate reduction of the effective stiffness, and empirical formulae describing the behaviour of the panels before and after buckling are being devised.

#### PHYSICS DEPARTMENT

**Silencers for Aircraft Engines.**—Detailed studies have been made of the silencers used with internal-combustion engines. Pure notes are introduced at the input, and the emergent sound is observed. It appears that silencers in general suppress the high notes rather than the low, and that certain types become more efficient for silencing low notes when (as in actual use) there is a stream of gas flowing through them.

## EIGHTY m.p.h. on 600 c.c.

### Sound Constructional Features of a Douglas-engined Single-seater Monoplane Built by an Enthusiast

**A**N intriguing little single-seater monoplane, the Topsy "S," with a 600 c.c. Douglas engine, has been built by Mr. E. O. Tips, who represents the Fairey Company in Belgium. According to Mr. Tips the machine flew for about an hour and a half on the first day it was launched and made several landings; no modification or adjustment was needed.

A low-wing cantilever monoplane was decided upon after several other layouts, such as biplane and braced monoplane had been investigated. The wing is entirely of wood. There is a main spar of "I" section, located at the deepest point of the wing section about the first quarter of the chord, and an auxiliary box spar. Between the spars is a rigid diagonal pyramid bracing which maintains the torsional rigidity of the wing. This is further guaranteed by stressed plywood skin over the leading edge. The wing section tapers from R.A.F. 48 near the root to R.A.F. 38 and 28 and becomes thinner at the tips. Ailerons are large and differentially operated. Fabric covering is employed aft of the main spar.

The fuselage, which is entirely of wood, embodies four spruce longerons with spruce frames assembled by birch plywood "biscuits," and is covered with a birch plywood stressed skin. The pilot's cockpit is located at the centre of gravity. It contains all the usual equipment of touring machines and a light metal seat shaped to take a parachute. There is ample space for light luggage.

The forward part of the fuselage is built integral with the wing. Flush with the trailing edge the rear part is assembled to this forward portion by four easily detachable nickel-steel



The Topsy "S" is an extremely pretty little aeroplane.

fittings. The fin is plywood covered and built in one unit with the rear portion of the fuselage. It carries a fabric-covered rudder, and is braced to the tail plane by two streamlined tubes. This latter member is fabric covered, has a plywood leading edge, and is adjustable on the ground. The elevators, likewise, are fabric covered. Rudder and fin are located forward of the tail plane and elevators, so as not to be screened by these members at large angles, or during a recovery from a spin.

Two low-pressure air wheels, held in forks attached to the main spar, are embodied in the landing gear, the attachment points of which have rubber bushes. The forks and wheels are covered by elektron fairings.

A 600 c.c. Douglas flat-twin engine is fitted and drives a two-bladed wooden airscrew. The engine mounting is of welded and riveted steel tubes, and the fireproof bulkhead, tanks and cowling are of aluminium.

The main data on the Topsy "S" are as follow:—

Span, 24ft. 6in.; length, 18ft. 9in.; wing area, 100 sq. ft.; tare weight, 287 lb.; all up weight, 532 lb.; maximum speed, 80 m.p.h.; cruising speed, 70 m.p.h.; stalling speed, 40 m.p.h.; take-off run (without wind), 160 yd.; landing run (without wind), 30 yds.

Climb and ceiling figures have not yet been measured, but appear very good as compared with those attained by other aircraft of equivalent power.





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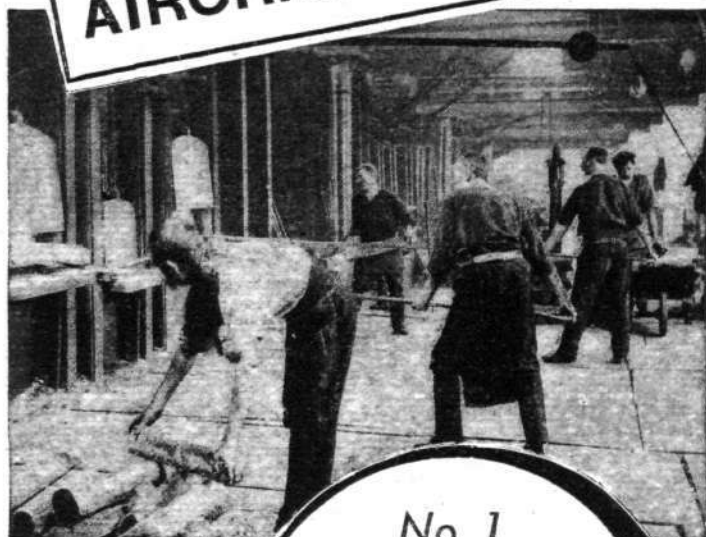
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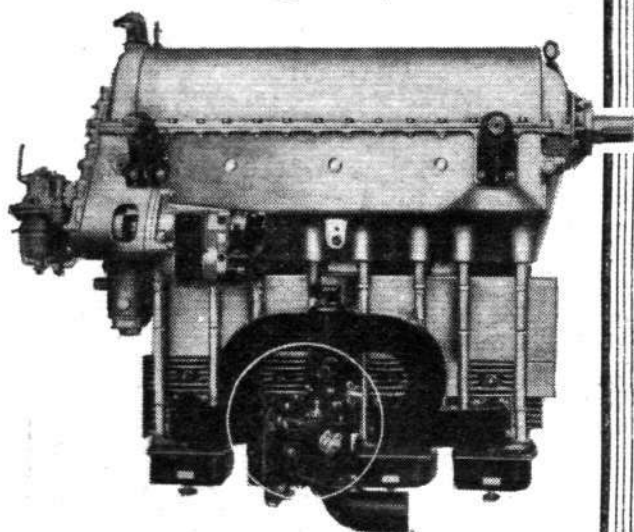
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# THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS



AIR MINISTRY ANNOUNCEMENTS



**BOMBERS INTO FIGHTERS:** The "Harts" (525 h.p. "Kestrel" I.B.) of No. 601 (County of London) Fighter Squadron display their new markings—alternate triangles of scarlet and black. These were adopted when the unit undertook fighter duties; formerly, of course, it was a bomber squadron. "Demons" are soon expected.

## ACQUISITION OF LAND

Lord Londonderry, late Secretary for Air, formally introduced into the House of Lords last week a Bill to speed up the process of securing possession of land for use in connection with the air expansion programme.

The Bill is entitled "a measure to repeal a proviso of Section 19 of the Defence Act, 1842." This section gives the military authorities special powers to acquire possession of land for military purposes where there is a refusal to treat or the parties do not agree.

The section contains a proviso that it shall not be lawful to use any land acquired under the compulsory process for barrack service or to erect barrack buildings on it.

By repealing the proviso the bill will bring land intended to be used for these purposes within the scope of the compulsory powers.

## THE QUETTA DISASTER

The Air Ministry announces that the following names must now be added to the list of those killed in the Quetta earthquake:—

Flt. Sgt. C. E. S. Taylor, Flt. Sgt. L. H. Powell, Actg. Sgt. A. G. Carr, L.A/C. G. J. Harman, L.A/C. T. F. Smith, A/C. J. P. Trainor, L.A/C. R. J. Miller, L.A/C. J. Pendlebury, A/C. J. C. Ratcliffe, L.A/C. R. Higgins, A/C. F. R. Adey.

## AWARDS FOR PROFICIENCY IN LANGUAGES

Beginning with the examinations to be held next month, the grant of awards for proficiency in colloquial Arabic, Kurdish, Persian, Syriac, and Turkish will be extended to airmen below the rank of flight sergeant whose duties render a knowledge of such languages desirable.

Instead of 22 awards of £20 each, the annual allotment will be 18 awards of £15 each to officers and 17 awards of £10 each to airmen (including warrant officers and flight sergeants). Awards are granted at the discretion of the Air Council, and the number as between officers and airmen in any year may be varied as circumstances may demand. The awards for each year will in future be made when the results of the January examinations are announced.

## EXTENSION OF SERVICE OF OFFICERS OF THE GENERAL DUTIES BRANCH

With reference to para. 13 of A.M.O. A.129/35, the following detailed instructions are issued regarding the methods of selection for extensions of service of officers of the general duties branch:—

(i) *Extensions of service of wing commanders, squadron leaders and flight lieutenants of the general duties branch.*—The service of selected wing commanders, squadron leaders and flight lieutenants will be extended by periods to be determined in each case up to a maximum extension to the age fifty. Selections of officers will be made periodically by the Air Council and applications from individual officers are not required. Selections of squadron leaders and flight lieutenants will be made from officers whose service has in the first instance been extended to ages forty-eight and forty-five respectively under sub-para. (iii) of A.M.O. A.19/35 or whose service has been extended beyond those ages in order to complete twenty years' service. The names of officers selected for extension will be published in Air Ministry Orders at least six months before they are due to be placed on the retired list. Officers whose service is extended will be eligible for promotion under normal rules. An officer may be placed on the retired list at any time during his extended service if the Air Council consider that his further retention is not desirable.

(ii) *Officers retained in the service to complete time for retired pay (A.M.W.O. 138/20).*—Selected officers whose service has already been extended to age fifty under A.M.O. A.574/28 will be invited to serve until they reach the age of fifty-five. Selections will be made periodically by the Air Council and the names of the officers selected for extension will be published in Air Ministry Orders at least six months before the date on which an officer is due to retire. The retired pay of officers so extended will be increased beyond the rate for which they are eligible on attaining the age of fifty by £9 for each complete year of service after attaining that age, subject to a maximum rate of retired pay of £317 per annum. The rates quoted are consolidated rates. Detailed instructions regarding retired pay will be issued in a separate order.

(iii) *Extension of service of medium service officers.*—Extension of service to complete eleven years on the active list followed by



four years in the reserve may be granted to medium service officers who volunteer and are recommended therefor. The gratuity in respect of the eleventh year of service will be £100. Applications from officers due to transfer to the reserve prior to April 1, 1937, should be forwarded as laid down in sub-para. (ii) of A.M.O. A.19/35.

(iv) *Extension of service of short service officers to seven years.*—The service of short service officers entered before April 1, 1932, for five years' active list service (including those whose service has already been extended to six years under sub-para. (i) of A.M.O. A.19/35) who volunteer and are recommended therefor will be extended to seven years on the active list followed by four years in the reserve. A gratuity of £100 will be payable in respect of each additional year's service on the active list. An officer granted an extension to seven years will be eligible for promotion to flight lieutenant under the conditions laid down in A.M.O. A.186/34. Applications from officers who were of three years' service or over on January 1, 1935, should be forwarded immediately. Applications from officers who will be of three years' service but under four years on January 1, 1936, should reach the Air Ministry by April 1, 1936.

### THE ROYAL AIR FORCE BENEVOLENT FUND

The usual meeting of the Grants Committee was held at No. 7, Idlesleigh House, Caxton Street, London, S.W.1, on the afternoon of Tuesday, June 4. Mr. W. S. Field was in the chair, and the other members of the committee present were: Mrs. L. M. K. Pratt Barlow, O.B.E. and Wing-Cdr. H. P. Lale, D.S.O., D.F.C.

The committee considered a number of cases and made grants to the amount of £312 13s. 4d. The next meeting was fixed for Thursday, June 20, at the offices of the Fund, at 2.30 p.m.

### AIR FORCE LIST

The June issue of the *Air Force List* has now been published. It can be purchased (price 2s. 6d.) from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

## ROYAL AIR FORCE GAZETTE

*London Gazette, June 4, 1935*

### General Duties Branch

The following Sub-Lieutenants, R.N., are granted temporary commissions as Flying Officers on attachment to the R.A.F. (May 19):—N. G. Hallett, G. K. Horsey, J. A. Ievers, R. L. Johnston, H. D. Mathew, G. C. Newcombe, R. C. B. Stallard-Penoyre.

F. F. Essam is granted a short service commission as Pilot Officer on probation with effect from and with seniority of May 20.

The following Pilot Officers on probation are confirmed in rank with effect from the dates stated:—V. E. Maxwell, A. W. B. Barrett (April 30); T. R. Vickers (May 16).

The following Flight Lieutenants are promoted to the rank of Squadron Leader (June 1):—H. L. P. Lester, H. E. Forrow, J. R. Bell, D.F.C., W. N. Plenderleith, C. H. Cahill, A.F.C., L. Darvall, M.C., S. M. Park.

P/O. W. N. Ash is promoted to the rank of Flying Officer with effect from Oct. 3, 1934, and with seniority of April 3, 1934; P/O. F. G. Frow is promoted to the rank of Flying Officer with effect from March 29 and with seniority of Sept. 29, 1934.

The following Pilot Officers are promoted to the rank of Flying Officer:—W. D. Woods (Dec. 7, 1934); C. F. Newcombe (April 16); T. C. Sanders (April 23); R. M. Bradley (May 7).

Wing Cdr. H. S. Powell, M.C., is restored to full pay from half-pay (May 13); Sqn. Ldr. R. M. Trevethan, M.C., is placed on the retired list at his own request (June 1). The short service commission of Acting P/O. on probation J. A. Dimalow is terminated on cessation of duty (May 28).

### Medical Branch

Flt. Lt. C. J. S. O'Malley, M.R.C.S., L.R.C.P., is promoted to the rank of Squadron Leader (May 14).

### Memorandum

The permission granted to Sec. Lt. H. H. Reeves to retain his

### R.A.F. CRICKET ASSOCIATION

Flt. Lt. G. H. White, of Halton Camp, has succeeded Sqn. Ldr. R. S. Sugden, A.F.C., as honorary secretary of the R.A.F. Cricket Association, with effect from December 11, 1934.

### R.A.F. ATHLETIC AND CROSS-COUNTRY ASSOCIATION

The Royal Air Force Athletic Championships will be held at Uxbridge from July 16 to 20, 1935, inclusive. The closing date for entries will be Wednesday, July 3.

### STATION ADDRESSES

The telegraphic address of the R.A.F. Balloon Centre, Rolleston Camp, has been changed to "Balloons, Larkhill Camp." Telegrams for the R.A.F. Detached Army Co-operation Flights, Knighton Down Landing Ground, Larkhill, are to be addressed "Aeronautics, Larkhill Camp."

Attention is again drawn to the necessity for using the correct postal address of Kenley R.A.F. Station, which is: "Royal Air Force Station, Kenley, Whyteleafe, Surrey." Letters with "Whyteleafe" omitted from the address are liable to a delay of one day.

### THE AVRO 652

The Air Ministry has just placed with A. V. Roe and Co., Ltd., a very substantial development order for Avro 652 (Conversion) monoplane. The original civil version, it may be remembered, is known as the "Ava" and is fitted with two Siddeley "Cheetah" engines of 275 h.p. each.

### OFFICE STAFFS AT OUTSTATIONS

It has been decided that, as from May 1, 1935, the working hours of members of the outstation staffs at present conditioned to a net working week of 42 hours are to be reduced to 40½ hours net. Where this can conveniently be done, the reduced working week is to be introduced on the basis of allowing an interval of three-quarters of an hour for the midday meal on the first five days of the week, thus making a gross working week of 44 hours. Where, however, it is found desirable to allow a longer interval than three-quarters of an hour for the midday meal, the gross working week must be correspondingly extended.

rank is withdrawn on his enlistment into the Territorial Army (March 20).

### Erratum

In the *Gazette* of May 28 notification concerning F/O. R. C. H. Tripp, M.R.C.S., L.R.C.P.—For Jan. 8, 1934, read Jan. 8, 1935.

### ROYAL AIR FORCE RESERVE

#### Reserve of Air Force Officers

The following Flying Officers are transferred from class A to class C:—E. N. V. Everett (Oct. 6, 1933); W. Armstrong, A.F.C. (April 15).

F/O. H. C. Devitt is transferred from class AA (ii) to class C (May 20); F/O. L. R. Mouatt is transferred to the Reserve, class A (Sept. 13, 1934). (Substituted for the notification in the *Gazette* of Sept. 18, 1934); the notification in the *Gazette* of May 28 concerning F/O. H. A. Francis is cancelled.

### SPECIAL RESERVE

#### General Duties Branch

P/O. F. F. Essam relinquishes his commission on appointment to a short service commission in the R.A.F. (May 20).

### AUXILIARY AIR FORCE

#### General Duties Branch

No. 605 (COUNTY OF WARWICK) (BOMBER) SQUADRON.—C. B. Thompson is granted a commission as Pilot Officer (May 14).

#### Medical Branch

No. 607 (COUNTY OF DURHAM) (BOMBER) SQUADRON.—F/O. D. A. Smith, M.B., Ch.B., is promoted to the rank of Flight Lieutenant (June 2).

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the Royal Air Force are notified:—

### General Duties Branch

**Squadron Leader.**—P. J. Barnett, M.C., to Headquarters, Coastal Area, Lee-on-the-Solent, 8.4.35; for Armament duties vice Sqn. Ldr. A. M. Wray, M.C., D.F.C., A.F.C.

**Flight Lieutenants.**—G. H. Randle, to D.T.D., Dept. of A.M.R.D., Air Ministry, 29.5.35. M. W. C. Ridgway, to No. 202 (F.B.) Squadron, Calafra, Malta, 21.5.35. F. E. Watts, to Central Flying School, Wittering, 28.5.35. R. Kellett, to Aircraft Depot, Iraq, Hinaidi,

13.5.35. K. C. McKenzie, M.B.E., to Headquarters, R.A.F., Middle East, Cairo, 13.5.35.

**Flying Officers.**—G. H. Denholm, to R.A.F. Station, Gosport, 30.5.35. M. V. Gibbon, to No. 56 (F) Squadron, North Weald, 30.5.35. J. C. Larking, to R.A.F. Station, Gosport, 25.5.35.

**Pilot Officer.**—R. E. Curry, to No. 57 (B) Squadron, Upper Heyford, 24.5.35.

### Stores Branch

**Wing Commander.**—R. W. Thomas, O.B.E., to D. of E., Dept. of A.M.S.O., Air Ministry, 27.5.35.

# COMMERCIAL AVIATION

## — AIRLINES — AIRPORTS —



**HILLMAN'S BIGGEST :** The first of the three D.H. 86 machines ordered by Hillman's Airways for their Paris service, taken by a *Flight* photographer while it was flying above the clouds near Hatfield. This machine is fitted with full dual control though the later 86's will have the swing-over type.

## THE WEEK AT CROYDON

*Heavy Holiday Traffic : A Diplomatic Fleet Returns : Converting the Unconvertible : Mr. Smith Goes Home : An Airport Loss*

**W**HITSUN traffic was particularly heavy, especially to Paris, Le Touquet, Brussels and Ostend. All regular services were fully booked and could have been booked over again. Many duplicate services were run, and England appears to have attracted holiday makers, for K.L.M. duplicated several inward services which were easily filled up for the return journey.

A gossip writer recently lamented the fact that air companies were no respecters of persons, for even a prince could not obtain a seat. Gossip columnists may like titles, but traffic managers must keep faith with those clients who have firmly reserved seats.

Special charter has been a feature of Whitsun air travel. Imperial Airways had the smaller units of the fleet flying ceaselessly to and from the Continent. There was a machine full of golfers, another full of tennis players, and an endless procession full of those who take their exercise in Casinos.

Westward Ho! has been the idea of many internal air travellers, and Provincial Airways found that the Plymouth, Newquay and Penzance bookings were very brisk. People who spend holidays each summer in favourite Devonshire or Cornish fishing villages have now started to spend long weekends down there also. Captain Olley has been busy as usual over the holidays, and all other taxi and joy-ride firms have flown to capacity.

Dr. von Ribbentrop, who came here a week ago with a fleet of two Junkers Ju.52 machines full of Naval experts, returned to Germany last Saturday with the same two aeroplanes. His own machine landed at Munich, but the other flew from Croydon to Tempelhof non-stop, a distance of some 600 miles, which was covered in three hours ten minutes.

The Royal Dutch Company has at last adopted the pleasant habit of flying a "house flag" from the nose of their bigger aeroplanes. Flags are apt to be blown clean away in big tri-motor machines.

Recently there was yet another air traveller who surprisingly swore there was nothing like flying. Above "the chops of the Channel" he was lunching peacefully when the captain or first officer pointed out a Channel boat with waves breaking over its bows, and a general tendency to stand up on end. The passenger was a director of a cross-Channel shipping company!

Mr. Smith, obscure and unknown to fame, went up to Glasgow by train and it made him ill. Being of the bulldog breed he won no less than six first prizes, fourteen specials and three challenge cups, despite the train journey. Coming back he felt he owed it to his dignity to travel by air, and he returned by R.A.S. in a specially reserved seat. Mr. Smith is a bulldog and the property of Mr. C. W. Hiscox, of Purley.

Dogs are in the news this week, for—alas!—Gyp, the constant companion of Mr. "Timber" Woods, has gone missing. Gyp has been a well-known figure at the airport for about eight years, and was famed for an intelligence denied to many who have been about the place just as long. One inexplicable trait in this dog's character was that he knew when his master was coming back after an absence even of days. He would whine and scratch until he was allowed to trot along to the aerodrome, where he would sit and await his master's landing. There have been occasions when Gyp was aware of "Timber's" approach when nobody had any particular reason to expect him.

A. VIATOR.

### Skegness Again

During the past two seasons, it will be remembered, a service has been run with a "Fox Moth" between the Midlands and Skegness. This year Crilly Airways are operating the service from Tollerton, and this was inaugurated on June 6. The route is covered twice daily, including Sundays, and the service will be run until the autumn.

## Commercial Aviation

### The K.N.I.L.M.'s New Equipment

Two of the three Douglas machines ordered by K.N.I.L.M. will arrive in Sourabaya at the end of June, and the third about a fortnight later. August is the date for the faster services.

### Sea and Air Again

Return tickets on the Africa route may now be used on the Blue Funnel and White-Star Aberdeen Lines' joint service to and from South Africa. Passengers will now be able to travel by sea or air in either direction with one ticket.

### In Manchukuo

According to the *Far Eastern Review*, commercial aviation in Manchuria has made rapid strides since the advent of the new State. In February there were no fewer than thirteen regular air routes operated by the Manchuria Air Transport Company. There is a growing demand for regular mail and passenger services and the use of aeroplanes for conducting special forms of operations in connection with public peace maintenance and for forestry survey and other aerial investigations.

### To the West

One of the mysterious little facts about air route traffic is that far more passengers travel by Provincial Airways to Penzance than to Hayle and Newquay. The Penzance aerodrome at Rosevidney is now fully licensed for private use.

During the last few days Provincials have done two "stretcher bearing" jobs—one from Penzance to Bournemouth and another from Penzance to Bath. The second case was originally to have been picked up in the Scillies, but the only available landing place there is hardly suitable yet for "Dragon" operation.

Provincial Airways are organising another display at Denbury, Torquay, on July 14.

### Children Half Price

The three inter-continental companies, Imperial Airways, K.L.M., and Air France, have decided, it is understood, to allow special facilities to school children visiting their parents who may be stationed along the Eastern air route.

From mid-June to the end of September children up to the age of fifteen will be able to travel to India or beyond at half fare—or, rather, they will be able to take a return ticket for single fare in order to spend the summer holidays abroad with their parents.

A member of the crew of the aeroplane will be in charge of these juvenile travellers, and special instructions for their care have been issued to the agents and representatives of the companies concerned.

### Educating the Agents

The Royal Dutch Air Lines and the A. B. Aerotransport recently invited seven travel agents from London to travel to Sweden by the Scandinavian Air Express. Mr. Ostelius, the London manager of the A.B.A., and Mr. de Jongh, of the K.L.M., conducted the party.

The trip included stays in Stockholm and Copenhagen, and Capt. Florman, managing director of the A.B.A., entertained the visitors on his motor yacht at Saltsjobaden and brought them back to Stockholm in the Ju 52 seaplane *Sodermanland*, which had just come back from its regular trip to Helsingfors. At Kastrup airport (Copenhagen) an early dinner was given, and the visitors left the aerodrome by a K.L.M. Fokker F 22 and arrived in London before midnight.

### More Aerodromes for India

With the object of developing aviation in India, the Central Government has asked the Government of Madras to select sites for a number of new aerodromes in Southern India. Six sites have consequently been selected, one at each of the following places: Cuddapah, on the Madras-Secunderabad air route; Kavali (Nellore district), on the Madras-Calcutta route; Villupuram (South Arcot district); Rameswaram (Ramnad district), on the Madras-Colombo route; Negapatam (Tanjore district), on what will probably be the air route between Singapore and Madras. The aerodrome at Meenam-bakkam, now used for Madras, will shortly be taken over by the military authorities and another site is to be selected for a civil aerodrome.

### Sikorsky in England?

It is reported that an issue on behalf of Sikorsky Flying Boats (associated with United Aircraft of America) is shortly to be made under the auspices of the British Aircraft Manufacturing Company.

### Batavia in Six Days

On Wednesday the K.L.M.'s new bi-weekly Batavia service to the new time-table was opened. The Douglas machines in use reduce the time of the whole journey to 5½ days; Athens is reached in one, Jodhpur in three, and Rangoon in four—yet no day's flying lasts longer than ten hours. The service starts at each end on Saturday and Wednesday and will be operated throughout the winter.

### Leeds to Douglas

Last week-end Blackpool and West Coast Air Services opened a new branch line to and from the Isle of Man and Yeadon aerodrome, Leeds. The service stops at Blackpool, so that the West Riding people now have the advantage of a direct air service to two of their favourite holiday resorts. D.H. "Dragons" leave Yeadon at 3.30 p.m. and leave the Island at 1.45 p.m.

Meanwhile one hears that United Airways are to run over the same route.

### Bulk Travel by Air

An agreement has been reached whereby Imperial Airways and other operating companies in the I.A.T.A. will, in future, be able to issue a form of season ticket covering periods of four months or one year. These tickets, which may be made out to include a family, represent a saving of about 20 per cent. on ordinary fares.

The ticket consists of a booklet of vouchers, so that it is an extension of the "bulk travel" ticket, which is already being used, rather than a real season ticket.

### Direct to Switzerland

Early next year it is possible that a new company, Alp Air Line, Ltd., will be operating a daily service directly from London to Switzerland. For some time it has been known that this new company, whose directors are also the directors of North-Eastern Airways, was being contemplated.

Negotiations are now well advanced for the use of an airport at Montreux, and there Alp Air Lines will have complete control. Airspeed "Envoys" will be used at first, though it is possible that Airspeed's new design will eventually be ready for use. On such a long-distance high-speed service what can only be called the Douglas type could be used with economy.

### Another Important Merger

Highland Airways, the pioneers of air travel in the north of Scotland, have now merged with United Airways, which is backed, of course, by the Whitehall Securities group. The company will still retain its own name and the organisation will remain under the management of Mr. E. E. Fresson.

This merger has particular significance inasmuch as it will eventually place the south in direct contact with the north by the western route. In the meantime, however, routes will only be developed where a distinct saving in time and expense can be effected through air travel. Thus, for the moment, the Kirkwall-Aberdeen service will connect with the express trains leaving for the south and arriving for the north. The time-table of Highland Airways' Kirkwall-Aberdeen services enables passengers to leave Kirkwall in the morning and to be in London the next morning.

Considerable expansion will, however, take place on routes which offer possibilities of development, and the first move will be to connect Aberdeen to Shetland via Kirkwall. The landing ground at Sumburgh is nearing completion and as soon as the radio D/F station, promised by the Air Ministry, is available the Aberdeen service will be extended to Lerwick. The Shetland mail will be carried over the Kirkwall-Aberdeen section.

The Inverness-Stornoway route will be the next to be developed through the merger and a trial service will in all likelihood be operated next month with an amphibian operating from Ullapool to Stornoway, the connection from Inverness to Ullapool being by road. Should this service prove the demand for an air service from Inverness to Stornoway, an aerodrome will be built at Stornoway, with an emergency landing ground at Ullapool, and a direct service will be run next year with land machines in conjunction with the radio ground organisation which is so necessary over this route.



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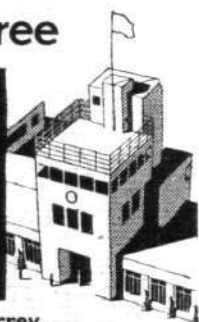
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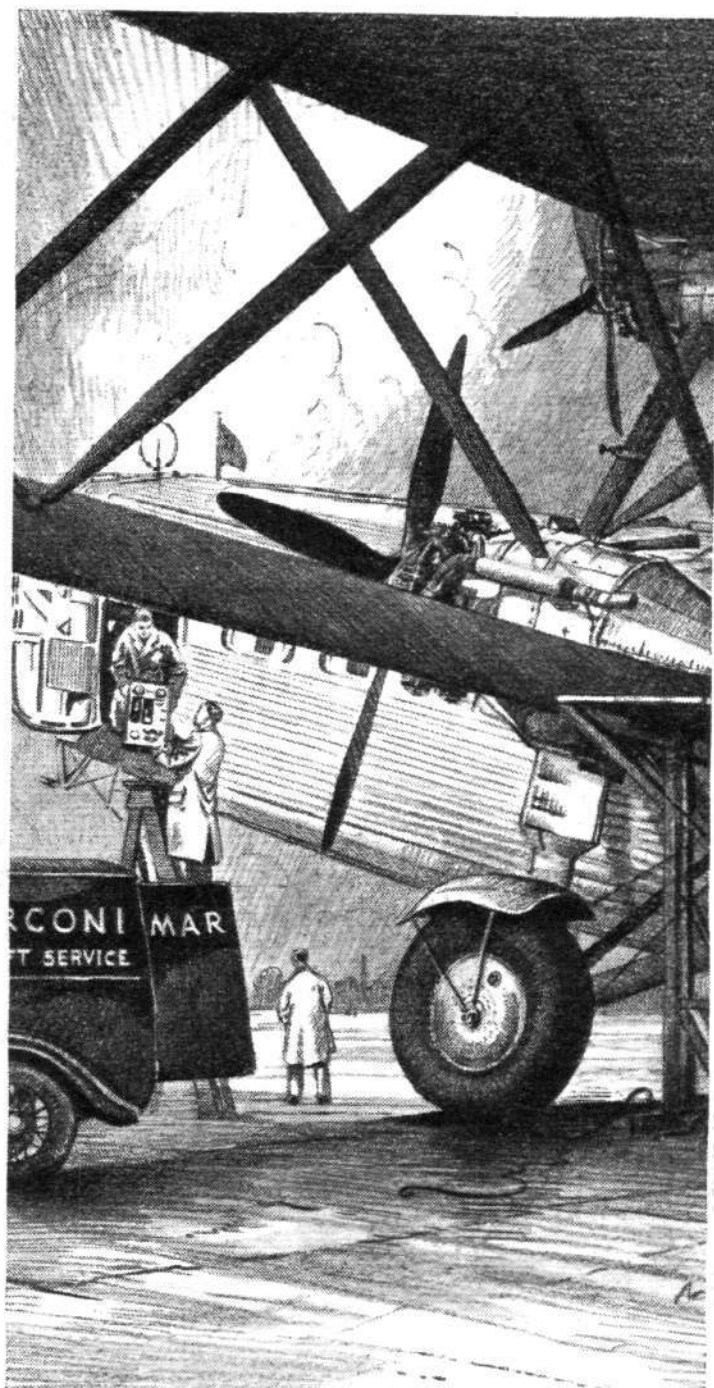
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### Sabena's Third Savoia

Last month the S.I.A.I. delivered the third S.73 to Sabena, the machine averaging 180 m.p.h. between Milan and Brussels on the delivery flight.

### Aerodrome Transport

During the last twelve months the London General Cab Company have serviced Heston airport and this year a 15 h.p. Citroën of the new streamlined type is actually stationed there. This car has, in addition, a special trailer attachment for luggage accommodation, and the charges are comparable with those for any other hire service.

### New Registrations

One or two interesting facts emerge from a study of the month's registrations. United Airways, for instance, have, or will eventually have, four D.H. "Rapides" for their Blackpool service. Aberdeen Airways have ordered another "Rapide" and two of the "Rapides" to be used by British Continental Airways were purchased from Hillman's; the latter, of course, are buying three new D.H. 86s.

Incidentally, there were 542 privately owned machines in this country on May 15.

### Schemes in India

The Government of India is about to embark on an ambitious aerodrome development programme. Tenders have already been called for the construction of ten new hangars at the principal aerodromes, one of which, of course, will be Karachi, where either one large or two smaller hangars will be constructed. The design of the building, incidentally, is left to the constructor.

These hangars, of various sizes, will also be built at Allahabad (on the present aerodrome at Bamraoli), Calcutta (at Dum Dum), Rangoon (on the new Prome Road site), Juhu (Bombay), Madras, Akyab, Cawnpore, Lahore and Delhi. At Madras, Akyab and Lahore the hangars will probably be built on the new aerodromes.

Negotiations, it appears, have now been completed for the installation of electric boundary lighting at Karachi, a new beacon is to be placed on the airship hangar and floodlighting to be arranged. In the meantime a three-lamp floodlight with shadow bar is being erected for demonstration purposes. At present a mobile light is used.

### Development in China

In the course of a wireless broadcast at Nanking, Dr. Chu Chia-Hua, the Chinese Minister of Communications, recently stated that, although the lack of communication in many parts of the country makes commercial aviation an urgent necessity in China at the present time, there is little hope of development until greater funds are available.

The China National Aviation Corporation is operating three lines from Shanghai, one to Szechuan, one to Peiping, and one to Canton. Plans have been drawn up for extensions to Patang, thence to Lhasa, with the hope of bringing Sikang and Tibet within easy reach. New aeroplanes will be put into service on the Shanghai-Peiping line this summer so as to make possible a daily trip each way. The Tsingtao-Weihaiwei line, by way of Chefoo, will also be started. Daily direct express flights from Shanghai to Hankow and *vice versa* will also be put into operation. Measures for operating a Canton-Honai line are now under consideration, and trial flights for the Chungking-Yunnan line have already been successfully carried out.

The Eurasia Aviation Corporation has met with diverse obstacles ever since its establishment. In 1933 the Shanghai-Sinkiang route was opened as far as Tadcheng. Owing, however, to local unrest in Sinkiang, the route was soon cut short, and is now flying only as far as Lanchow as its western terminus. The Corporation, however, is extending the existing route to Ha-mi. It is further planned to increase the number of flights on the Peiping-Canton, the Lanchow-Ningsia and the Ningsia-Paotow routes, all of which were put into operation last year. Plans for the Sina-Chengtu and the Canton-Yunnan routes, to develop the facilities of communication in North-west and South-west China respectively, are also under consideration.

Both these concerns are devoting attention to the training of competent Chinese pilots.

### Cloud Flying at Barton

Since May 20 the Manchester Airport has been allotted the control of instructional cloud flying within area No. 52, which is bounded by straight lines joining Bolton, Oldham, Stockport, Wilmslow, Hoylake and Great Crosby.

One hundred and seventy-four passengers and 2,054lb. of freight passed through Manchester Airport in the fortnight ended May 28.

### Meteorology at Ards

On May 25 the Ards Airport staff had something of a shock when a glider appeared silently in their midst. The pilot proved to be Mr. J. P. Mackie, an Ards first soloist of the previous Wednesday, whom the Ulster Gliding Club had mercilessly launched from Scrabo Monument, 600ft. above.

On May 31 Mr. Bertram Mills left for Hatfield by chartered "Fox Moth," after judging the finals at the Belfast Horse Show. The rumour that a fleet of "Heracles" has been chartered to convey his elephants across the Alps is untrue.

On May 14 Ards was visited by Mr. Dewar, the meteorological expert at Aldergrove, who demonstrated, among other things, the use of hydrogen balloons for obtaining the height of low cloud. After a good deal of trouble the unstable sphere was eventually released by the airport manager, with his stopwatch held in a steady hand. Now a daily weather report is telephoned from the Ards Airport to Aldergrove at 8 a.m.

### From Heston

On June 1 the London services of Jersey Airways started to run twice daily, and on the same date Spartan Air Lines opened their new daily service to Sandown. This is separate and distinct from the existing services, which continue to run to Cowes, calling at Bembridge on request. Jersey Airways' motor coaches for Heston, incidentally, now depart from Victoria Station, on the Continental side, opposite Imperial Airways' terminus.

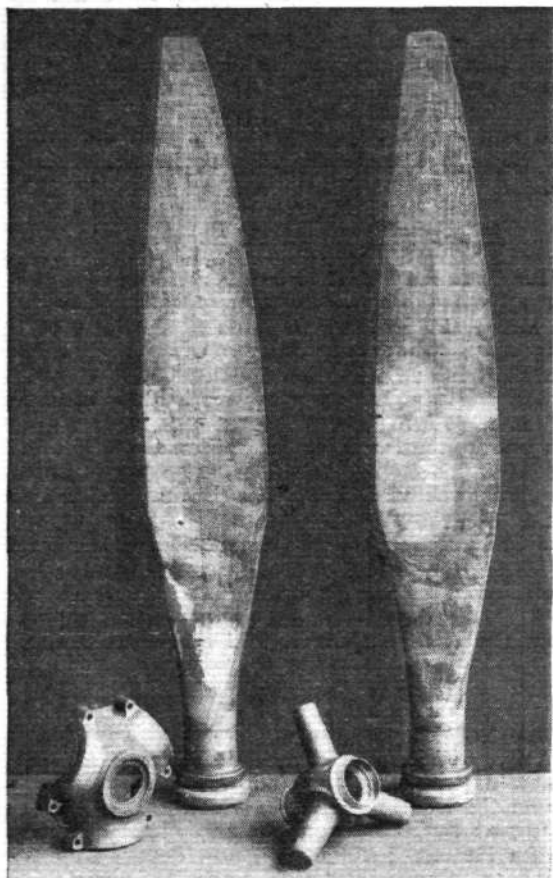
Le Touquet was served at Whitsun by North-Eastern Airways, in conjunction with Commercial Air Hire, Ltd., which has now taken an office at Heston. The Avro 642 was used and this service will be resumed during every week-end after June 28, outward services leaving on the Friday and Saturday and return services on the Sunday and Monday. The fares are £3 15s. single and £6 return.

No less than four stretcher cases were handled at Heston this week. A "Dragon" was chartered from Jersey Airways to take a girl, accompanied by her doctor and relations, to London for an operation. Two days later she was flown back in the same machine, operation over and all well. Another patient arrived from Blackpool and a third from Cannes.



**ARTIFICIAL SUNLIGHT:** The third of Heston's new Chance floodlights in its laminoid housing on the single-storey roof of the traffic office. (Flight photograph.)





(Left) Two blade forgings, one half of the hub barrel, and a spider. Above is seen the operation of grinding the blade down to exact shape. (Flight photographs.)

## HOW C.P. AIRSCREWS are MADE

*Interesting Processes in the Manufacture of the  
Hamilton Airscrew at Stag Lane : Working to  
Very Fine Limits*

RECENT articles and correspondence in *Flight* have concentrated attention on the subject of the variable-pitch airscrew, or, as it has more recently come to be called, the controllable-pitch airscrew, the latter expression being, perhaps, more descriptive. It may therefore be of interest to readers to learn something about how one type of C.P. airscrew is manufactured, so far the only one to be in quantity production in this country. This is the De Havilland C.P. airscrew, manufactured under licence from the Hamilton Standard Company of America.

As most readers of *Flight* will be aware, the De Havilland Aircraft Co., Ltd., transferred to new works at Hatfield some months ago, but the old works at Stag Lane have been retained, and the De Havilland aero engines are still being manufactured there. A portion of the old aircraft works, the erection shops, has been turned over to the production of controllable-pitch airscrews, and an

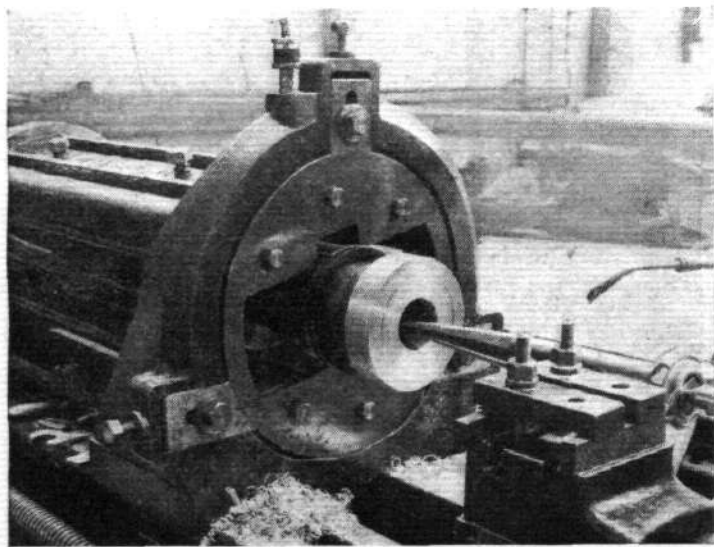
extensive plant of machine tools, etc., has been installed. Production has begun, and C.P. airscrews for the Bristol "Pegasus" engines and for the De Havilland "Gipsy Six" are now coming along fairly fast.

All the machining operations on the airscrew parts are being carried out at Stag Lane, but blades, hub barrels, spiders, and so forth, which are forgings, are obtained from outside.

The blanks for the light alloy blades are supplied by High Duty Alloys, Ltd. Most of the machining operations on them are carried out by the De Havilland Company, but an exception is the shoulder on the blade root. This shoulder bears against one side of the roller bearing which takes the centrifugal pull on the blade, the flange on the hub barrel bearing against the other side. The work of forming this shoulder is done by Turton, Platts, and Co., the roller races having to be slipped on before the shoulder is formed, or before the up-ending process, as it is called. Thus the blade blank arrives at Stag Lane with the blade root already up-ended. The machining of the shoulder is, however, done in the De Havilland shops, a Broadbent lathe with a 15ft. bed and 10in. centres being used for this and for boring the internal diameter of the hollow blade root. The forging is held in a turning cradle and the boring has to be interrupted at intervals to clear out the swarf by compressed air. A machine is to be obtained shortly which, being vertical, will permit the swarf to fall out, and for other reasons as well will shorten the time taken to bore out a blade root. The work has to be very carefully done, two conical faces having to be machined to fit exactly the two tapers on the spider.

When the shoulder and internal bore of the blade root have been finished the blade is transferred to a table on which the face is worked by hand, the small curvatures to be dealt with making this a fairly short operation. The blade is then turned over and the cambered side worked down to contour, first by a milling cutter and afterwards by an electrically driven grinder. Gauges for front and back of the airscrew blade at stations spaced 6in. apart are used, the opposing gauges meeting on leading and trailing edges.

After shaping, the blades are rough polished and then transferred to a bath of hydrochloric acid, rinsed in

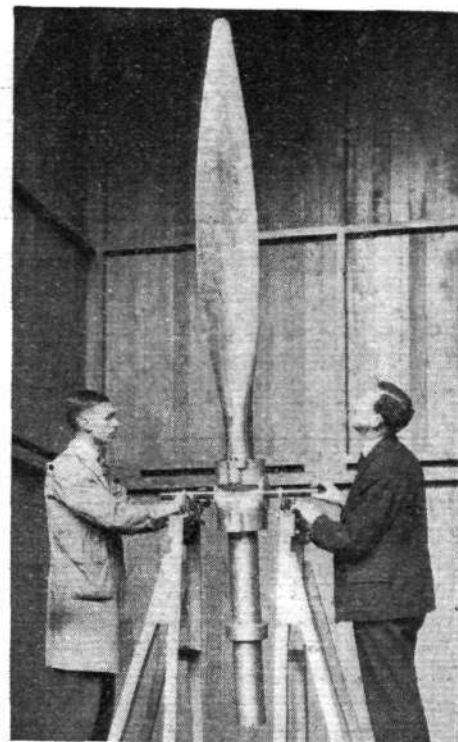


Reamering the inside of the hollow blade root. The next operation is smoothing the bore with another tool. The airscrew blade is held in a cradle on a long lathe. (Flight photograph.)



Above are seen the components of an airscrew hub. The names of the parts are given in the illustration.

Balancing a blade: A cylindrical rod rolling on knife edges forms the support, and the blade is balanced against a calibrated weight, as shown on the right. (*Flight* photograph.)



cold water and immersed in nitric acid. This is washed off in a bath of boiling water and the blades are then examined for minute cracks. If no defect of any kind has come to light the blades are balanced against a graduated master weight, which represents, so to speak, a standard blade. The balancing is done by supporting the blade and master weight on a cylindrical steel rod which rests on knife edges.

To illustrate the care necessary in getting the balance exactly right, it may be mentioned that each airscrew, complete with its hub and C.P. mechanism, of course, is first assembled and balanced dry. Grease is then forced into the hub under great pressure, and the airscrew is balanced once again. If the grease has penetrated properly to every corner in each blade the balance should, of course, still be perfect. If, for any reason, it has penetrated farther in one blade root than in another the fact will show on final balancing.

The work on the parts of the hub has to be equally meticulous. As previously mentioned, the forgings for hub barrel and spider are obtained from outside. The two halves of the hub barrel are forgings by the English Steel Corporation, in D.T.D. S82, while the spider, in D.T.D. S81 steel, is supplied by Firth Derihon. The subsequent work on the steel parts of the hub is mainly plain straightforward machining, and does not call for any special comment.

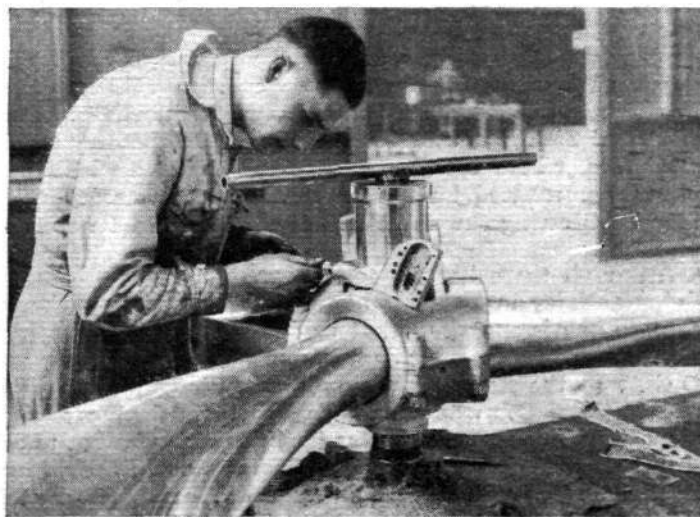
It will be realised that the loads are very heavy, and that if the slightest play were allowed during assembly the least amount of extension and deflection while running would result in play developing, and this, in turn, might give rise to flutter and cracking.

It is understood that the "Gipsy Six" controllably-pitch airscrews now being manufactured at Stag Lane will probably be put on a D.H.86 to be tested out in actual flight. In the meantime one of these airscrews is being sent to the Hamilton works in America to be tested out on a special machine which introduces artificially vibrations of a magnitude far greater than would ever occur on any actual engine. This machine brings to light any faults in design much more rapidly than would operation on an engine in flight or on the test bed, and information is thus made available quickly after the introduction of each new design. Incidentally, it is of interest to learn that calculations indicate that the cruising speed of the D.H.86 should be very materially increased by the fitting of C.P. airscrews. This, of course, is due to the fact that the engines will then be run at full throttle, the speed

being kept down to cruising revs by the setting of the airscrew blades.

Mention was made earlier in these notes of the fact that controllably-pitch airscrews for the Bristol "Pegasus" and "Gipsy Six" engines are already being manufactured in considerable numbers. These are by no means the only models, and preparations are being made for making airscrews for all the "Bristol" models, for the de Havilland "Gipsy Major," as well as for all the Rolls-Royce aero engine types. In the case of the Armstrong-Siddeley aero engines controllably-pitch airscrews will be manufactured for all the higher-powered models (the smaller scarcely requiring them), while plans are in hand for C.P. airscrews suitable for the Napier series of engines. It will thus be seen that it should not be long before these airscrews are available for fitting to any suitable British engine.

At present it is not possible to give exact figures of weight and price. As a very rough guide it may, however, be taken that the extra weight of a controllably-pitch airscrew is somewhere in the neighbourhood of one-half pound per horse-power. This figure does not cover the entire range, being lower for the lower powers. As regards cost, it is again difficult to quote figures, but something in the region of £2 per pound weight will not be wildly wrong.



Final assembly. The airscrew is first assembled dry, it is then balanced and grease is forced into the hub under great pressure. A final balance then ensures that the grease has penetrated everywhere. (*Flight* photograph.)

# PRIVATE FLYING

SOME FURTHER POINTS OF INTEREST  
OBSERVED BY LORD SEMPILL ON  
HIS RETURN JOURNEY FROM AUS-  
TRALIA: A SUMMARY OF HIS MONO-  
PLANE'S 50,000-MILE PERFORMANCE

I SPENT a most interesting time at Delhi as the guest of His Excellency the Viceroy, who is doing so much to encourage aviation by personal example. On his new machine, the Avro 642, he is able to fulfil engagements in many parts of India which would be difficult and extremely expensive to reach by means of ground transport alone. This zeal for flying is shared by Lady Willingdon, who not only accompanies the Viceroy by air on his official duties but utilises the aeroplane for personal visits.

Leaving Delhi, I followed the Imperial Airways route to Karachi, refuelling at Jodhpur—that really remarkable aerodrome which owes its efficient ground facilities so largely to the Maharajah of Jodhpur, whose keenness for aviation is being emulated to a growing extent by other native princes. There is little to comment upon on the journey between Karachi and Baghdad. On the return journey I stopped at Gwadar on the coast at the western borders of Baluchistan, which is recognised at some distance by the prominent rocky formation known as the Cathedral Rock. I found the aerodrome provided ample landing area, but was very dusty.

After Baghdad one passes for some distance along the valley of the Euphrates, via Rutbah and over long stretches of featureless desert. There are landing grounds available along this route where one can come down if overtaken by a dust-storm. There are, however, no facilities, and the course is only easy to follow in clear weather and if one keeps the pipe-line in sight. It is, therefore, necessary to pay careful attention to navigation in order to avoid getting lost. On this occasion, instead of going through to Gaza, I landed at the R.A.F. station at Amman, continuing just before sunset to Maan, where I stayed at the R.A.F. Mess.

## Over the Holy Land

ON leaving Maan next day I passed over the famous city of Petra, the buildings of which are rose-coloured, being cut out of the solid rock. The town stands on the hills east of the valley of the Jordan and south of the Dead Sea; its history goes back to pre-Biblical days. From there I continued my flight round the northern slopes of Mount Sinai, on which is situated the Monastery of St. Catharine, where the famous Codex Sinaiticus which was recently purchased for the British Museum was originally found. Crossing the north end of the Red Sea I was soon at Cairo.

Although there has for some time been a good deal of flying activity in Egypt, when one considers the excellent climate one is surprised that private flying has not taken a greater hold. A great deal of work is being done by the D.C.A. to the Egyptian Government, Sir Quintin Brand, K.B.E., D.S.O., who has had a distinguished career in the R.A.F., to organise better facilities for aviation, and I found all the Egyptian officials, Customs and Police, most helpful and obliging. During my visit I met His Excellency Tahia Pasha and Eloui Bey, who are prominent public men with a tremendous belief in the future of flying. They are both far-seeing personalities, and travel by air whenever possible. Realising as they do the great benefit aviation may confer on Egypt, both internally and as a junction with connections between two great branches of

# Over the Empire Routes

the Imperial routes, they are anxious to encourage flying by every possible means. Especial mention should be made of the fine work being done by Misr Airwork. The shops at Almaza Aerodrome are well equipped, and there is an excellent clubhouse. Apart from providing very good ground facilities, Misr Airwork have organised a flying school and run air lines within the confines of Egypt and to Palestine. A feeling of sadness prevailed after the recent death of Captain Spooner, who had done so much to popularise flying. His was a real pioneering family, and it is on the unflagging efforts of such that the success of aviation has been built.

## Adverse Weather

FROM Cairo homeward I encountered adverse conditions. The crossing of the Mediterranean Sea from the African coast to Athens took longer than usual, due to the heavy head winds, which increased from 20 m.p.h. on the first 300 miles to 35-40 m.p.h. on the last 200 miles. My petrol capacity, therefore, while adequate, did not leave much reserve. On the return journey I made use of the aerodrome at Mersa Matruh, which is being extended, and now has an excellent shed. At this stop I met Flt. Lt. MacIntyre, well known as one of the chief pilots on the Houston Everest Expedition. He had flown with his bride on their honeymoon trip from England on his "Leopard Moth," having taken the course along the African coast.

From Athens the weather was still against me, and as I passed Patras, in the Gulf of Corinth, the wind increased to gale force, accompanied by low clouds and sleet. In the circumstances there was little possibility of arriving at Brindisi before dark, and it was doubtful whether my petrol would hold out, so I decided to make a landing on a stretch of sand on the western side of the Island of Corfu. This I did successfully, and dug-in the machine to make it secure until the morning. The next day I was able to proceed, and reached home without further adventure.

My six months' flying tour had taken me to many places which could hardly have been reached by other means. That part of the journey which could have been reached by ground transport would inevitably have taken at least 100 per cent. longer. In all, some 50,000 miles were covered; the petrol consumption of my "Puss Moth" worked out at about 22 m.p.g., and approximately one gallon of oil sufficed for 1,200 miles. The petrol used was Stanavo, and the lubricating oil Vacuum H, the last part of the flight being done on the new product "Redband."

## With Flying Colours

ON arrival, the machine, which is now in its fifth year, was examined by A.T.D. representatives, the De Havilland Company, and the suppliers of the dope. They pronounced themselves more than satisfied with the condition of the machine, which speaks volumes for the efficiency of the staff at the workshops at the London Air Park, who had been entirely responsible for the maintenance and C. of A. work on the aircraft since it was first registered. After very careful examination, the machine required but few minor replacements, and has already done nearly 100 hours since my return. Actually, the engine, which is in excellent condition, is due for a complete overhaul, as the machine has been flown at least 100,000 miles since this was last undertaken. All this is a great tribute to the wonderful reliability and efficiency of the modern power unit when carefully maintained and not overstressed.



# BRIAN LEWIS

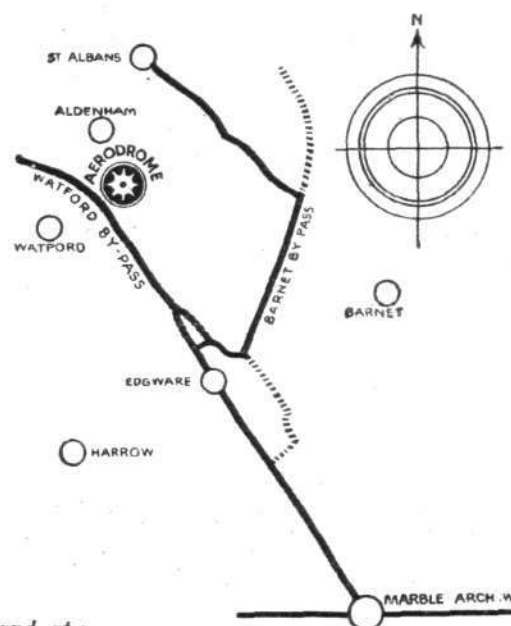
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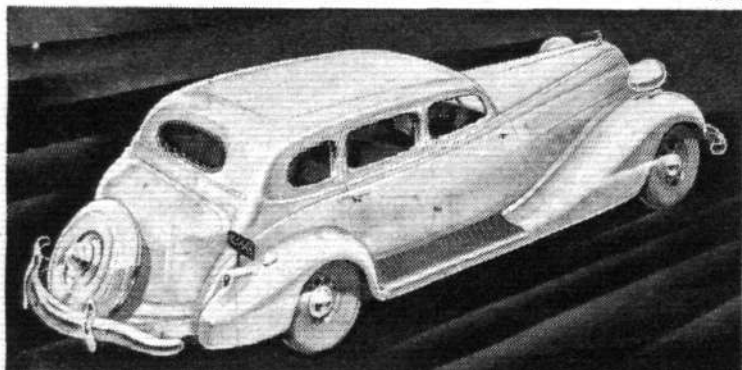
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# FROM THE CLUBS

*Events and Activity at the Clubs and Schools*

## YORKSHIRE

Thirty-two hours were flown on Yorkshire Aeroplane Club machines last week. Mr. F. E. Rhodes passed his "A" licence tests, and Mrs. A. K. Dawson has joined the club as a flying member.

## NORTHAMPTONSHIRE

As in the cases of most of the clubs, flying was rendered impossible at Sywell on three days of last week by the very high winds. However, Sunday's good weather brought an unusually large crowd to the aerodrome, and the new swimming pool, which is shortly to be constructed, was one of the main topics of conversation.

## HAMPSHIRE

During last month the Hampshire Aeroplane Club flew 215 hours with the five machines at present in use. Mr. L. T. H. Greig, a director of Jersey Airways, who, incidentally, went solo in a surprisingly short time, obtained his "A" licence, and Mr. E. G. Burry went solo. New members were Messrs. G. S. Meek, H. E. Harding, and J. Winning.

## CAMBRIDGE

Despite two non-flying days, 34 hr. 25 min. were flown by the Cambridge Aero Club and by Marshall's Flying School during the week ended June 7. Mr. T. G. H. Kirkwood made his first solo, and Mr. A. L. Paterson completed his "A" licence tests. On Sunday six members of the C.A.S.C. arrived at the aerodrome, and five of them flew.

## REDHILL

Bad weather prevented flying by the Redhill Club on one day of last week and severely curtailed the flying on others. During the week 79 hr. 30 min. were flown, and Mr. Walker made the night flight for his "B" licence. New members were Messrs. G. P. M. Eves, F. G. Sutton, G. B. Thomas, and R. Geddes. The Anglo-American Company's "Rapide" is now housed at Redhill.

## HANWORTH

Work has been started on the new club hangar at Hanworth, and it is hoped that this will be completed within the next few weeks. During the past fortnight 64 hr. 40 min. were flown by the club, Cdr. J. Hughes Hallett passed the test for his "A" licence, and two new members—E. A. Sams and E. Bridger—joined.

Machines are now available for flying at Aldenham aerodrome, and Major H. Shield is the manager there.

At the Autogiro School the 41 hr. 40 min. flown during last week included six hours flying on the C.30 chartered by the Metropolitan police for traffic control on Derby Day. This machine, of course, was equipped with a Marconi receiving and transmitting set.

A first Autogiro solo was made by Herr Behrenet, who is the chief instructor of the Austrian Aero Club.

## LIVERPOOL

High winds and rain have severely curtailed flying by the Liverpool and District Aero Club during the past week, when 58 hr. 40 min. were flown.

## MIDLAND

Bad weather has limited flying at the Midland Aero Club on several days, and the flying time last week totalled 48 hr. 25 min. Cross-country flights were carried out to Braunstone and Walsall, and new members included Mr. A. D. Wimbush and Miss J. Wimbush.

## CARDIFF

During last month the Cardiff Aeroplane Club flew 129 hr. 25 min. A fortnight ago Mr. E. L. Smith joined as a flying member, and on May 30 Capt. Findlay flew Mr. Fred Darling, the trainer, to Ireland and back. This is the first time that a machine has been cleared for Customs from Wales to Ireland.

Western Airways have been making good use of the new flood-lighting system.

## HATFIELD

Two members—Messrs. G. K. H. Gourlay and C. A. Pritchard—completed their "A" licence tests at the London Aeroplane Club last week, during which the total flying time was 88 hr. 10 min. Mr. D. E. Henderson made his first solo, and four new members—Messrs. A. M. Carroll, C. G. Clegg and C. T. Berry and Mrs. Brown—joined the club.

Visitors included Mr. Blomberg, of Stockholm, who came with the Director of Technical Development of the Swedish Air Force, and Mr. T. A. Campbell Black, who came with his sponsor to inspect his new "Comet."

The arrangements for the Royal Air Force Flying Club's third annual display next Saturday are now complete. Last week *Flight* published a description of the luncheon which was held at the Café Royal on June 3.

## BROOKLANDS

On Monday of last week Mrs. Flora Drummond brought down some 150 delegates of the Women's Guild of Empire to Brooklands, and most of them were taken for flights. They were afterwards addressed by Capt. Macmillan.

Four members joined the club last week, including the Hon. J. P. Bowes Lyon. Mr. J. W. F. Beach is renewing his "A" licence, and Miss Knight Bruce has gone solo. Miss Cunnison has completed her blind flying training, and Mr. Moorby is training for his "B" licence. The technical instructor, Mr. R. Ashdon, is now a first-class navigator, and he was, incidentally, the only candidate to pass the examination this year.

Another extension of Brooklands Aviation, Ltd., takes the form of a club at the new Brighton municipal aerodrome at Shoreham. Mr. B. S. Smallman, at present the social secretary at Brooklands, will act as manager.



**RESERVISTS IN CLOVER:** The buildings designed to accommodate the machines and pupils of the Reserve school at Sywell are now complete and were opened last Tuesday.



Private Flying

**PENANG**  
During 1934 three D.H. "Moth Majors" were acquired by the club. The number of flying members increased by 19, and non-flying members by 20. These machines flew 340 hr. 25 min., 424 hr. 30 min., and 171 hr. 55 min. respectively. Twenty-two members went solo, and 11 members qualified for "A" licences, despite the fact that flying instruction did not commence until May 15.

**BENGAL**  
During the month of April a total of 56 hr. 35 min. was flown by the Bengal Flying Club. This low figure was caused by the fact that the club suffered a most unfortunate loss when two machines were involved in a collision with the loss of four lives, including those of Mr. B. K. Das, who has been a pilot since 1929 and was a very popular member of the club, and of Mr. D. K. Roy, who recently returned from England after obtaining his "B" licence. Fortunately, the owners of another machine came to the club's rescue, and this machine has been used for dual instruction pending the arrival of a new aeroplane.

Mr. P. Bose passed the tests for his "A" licence, and Mr. D. D. Sarawgi made his first solo.

**KARACHI**  
In some ways April has been an unfortunate month for the club. The night flying "Moth" was almost totally destroyed in a crash. The acting ground engineer, Mr. G. V. Gadgil, and six apprentices were working at high pressure and expected to have the machine rebuilt by the end of the month. Flying time during April amounted to 142 hr. 50 min. The "Leopard Moth" has been particularly busy, and was responsible for nearly half the flying hours. Mr. Webster, who flew this machine to the Rann of Cutch in order to discover the breeding place of flamingoes, stated that the trip, which was made in two hours, would have taken three weeks by camel, bullock-cart and on foot.

Mr. N. A. Mistry has taken his "A" licence, and "B" licences have been granted to Messrs. N. R. Gogte and R. E. Tata.

Airwork Sales Plans

The policy and plans of the Airwork Sales Department have now ripened and it is possible to give more specific details. A start was made by acquiring the aviation interests of Henlys.

Mr. J. J. Parkes, Technical Manager and Chief Test Pilot of Airwork, will direct the new department and the engagement of sales personnel was recently completed. Airwork has secured the services of Mr. Dudley ("Batts") Page as Assistant Sales Manager, and working under him are Mr. Richard L'Estrange Malone, Mr. Mark Lacayo and Mr. James B. Turnbull.

Encouraging Ownership

Few people realise that Aircraft Exchange and Mart operate from three aerodromes in addition to Hanworth—at Aldenham, Hertfordshire, Ramsey, Isle of Man, and Denham, Bucks. This and a number of interesting facts concerning tuition, ownership, maintenance and charter are given in a little book which has been produced by the company for the benefit of those lightly interested in the possibilities of flying.

For the S.B.A.C. Trophy

In addition to the race for the S.B.A.C. Challenge Trophy at Bristol on June 15, the Bristol and Wessex Aeroplane Club is holding a private Garden Party at which aerobatic exhibitions and demonstrations will be given. Mr. Kronfeld has also promised to bring a B.A.C. "Drone," and private owners and members of other clubs are cordially invited.

The following is the list of entries which have been received for the race:—

Entrant.	Pilot.	Machine.
Sir Charles Rose, Bart.	Sir Charles Rose ...	Miles "Hawk."
Lancashire Aero Club...	R. F. Hall ...	Avro "Cadet."
Lady Blanche Douglas	Lady Blanche Douglas	Miles "Hawk."
Lord Willoughby de Broke.	Lord Willoughby de Broke.	B.A. "Eagle."
Bristol & Wessex Aeroplane Club.	R. Ashley Hall ...	"Gipsy I Moth."
Hampshire Aeroplane Club.	C. R. P. Curtis-Nuthall	"Cirrus Moth."
Mr. F. J. A. Cameron...	F. J. A. Cameron ...	"Leopard Moth."

**KUALA LUMPUR**  
The total flying time for 1934 was 2,214 hr. 40 min., an increase of 439 hr. 30 min. over the total of the previous year. During the year twenty-five members qualified for "A" licences.

**TOLLERTON**  
During last month the flying time at the Tollerton Aero Club totalled nearly 156 hours, and during last week the time was 20 hr. 35 min. Sixteen machines visited the aerodrome, and two new flying members joined the club. Cross-country trips were made to Doncaster, Sherburn and Leicester.

**READING**  
On Sunday, June 2, the new Miles "Hawk" was presented to the members of the Reading Aero Club, and was christened by Lady Adeline Muskertry. Mr. George Royle said that in presenting the basic sum to start the fund for the new machine he considered that he was doing what his late son would have liked best. He thanked Viscount Wakefield and those members who had subscribed the balance of the cost.

The new machine is finished in blue and silver, and the Air Ministry has allowed the registration ADGR to be allotted to the machine.

**TORONTO**  
Last year the Toronto Flying Club, which was formed in October, 1927, flew 1,356 hours, and the membership is now 350. The present equipment consists of one "Gipsy Moth," two "Cirrus Moths"—one of which, the gift of Lord Wakefield, has been in service since the formation of the club—one "Cirrus Avian," one "Genet Avian" and two "Puss Moths." The "Avian" is equipped for blind flying instruction, and the Toronto Club, incidentally, is the only civil organisation in Canada where this instruction is given.

The club operates its own Customs airport with fully equipped clubhouse, workshop facilities, and night flying equipment. Since 1927 more than 9,000 hours have been recorded, and twenty-five students were under instruction last month.

Soaring in America

The Sixth National Soaring Contest, conducted by the Soaring Society of America, will be held between June 29 and July 14, at Elmira, N.Y.

One Seat Less

The "Hawk Major" being built for the King's Cup Race, and illustrated in *Flight* last week, is, of course, a single-seater and not a two-seater as inadvertently reported.

Brian Lewis' New Base

Since sundry rumours suggesting that Brian Lewis and Co. were leaving the business have been circulated within recent weeks it might be as well to state that the company is carrying on as before.

Temporary accommodation has been taken at Aldenham aerodrome, near Elstree, and there Mr. Cameron, the ground engineer, will always be available. Mr. Gordon Marshall will be in charge and the office remains at 30, Conduit Street.

The firm's Hooton branch is under the control of Mr. R. Holme, and that at Renfrew is in charge of Mr. W. Gairdner. At both these aerodromes a comprehensive stock of D.H. spares is carried, and private owners will be welcomed there as well as at Aldenham.

The Witney Party

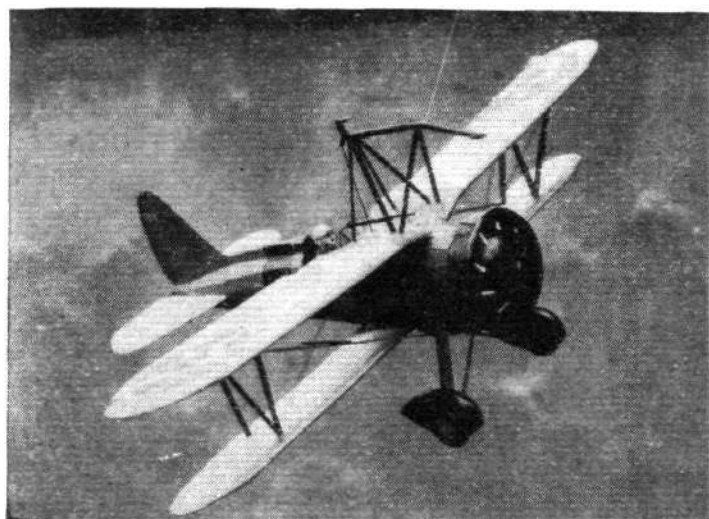
The official opening and garden party of the Witney and Oxford Aero Club took place last Saturday. Her Grace the Duchess of Bedford attended the garden party, officially opened the club, and also presented the prizes.

The fourth landing competition was won by Mr. H. G. Goddard, a club member, on a "Cirrus Moth," while the arrival competition for style of approach and landing resulted in a draw between Flt. Lt. R. C. Preston and Flt. Lt. T. Rose. A final decision was made by tossing a coin, and Flt. Lt. Preston won. There was actually another arrival competition on normal lines with a sealed time of landing, and that was won by Mr. Northwood, of the Cotswold Club.

Capt. the Rt. Hon. F. E. Guest was present, and there were about twenty machines and about 200 people present. Joy-riding was carried out on the club machines and by Western Airways with a "Dragon." A three-seater Spartan was also working hard.

## MODELS

*News for Miniature-aircraft  
Enthusiasts : What the  
Clubs are Doing*

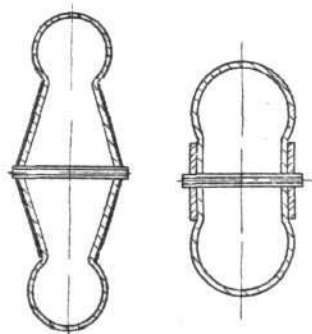


### ENERGETIC

THE two excellent flying models illustrated at the top of this page are the work of Mr. L. S. Wigdor, who is only 15½ years of age, yet has built a most remarkable fleet of flying scale models, mainly—and “unfortunately,” as he says—of American types. Another photograph which he encloses shows a lawn which rather resembles a flying meeting for there are a score of varied and most realistic looking machines parked upon it.

### MAKING WHEELS

AN ordinary indiarubber ball is the basis of a simple method of making landing wheels, suggested by Mr. J. L. Beilschmidt. Each ball is pierced at diametrically opposite points, and then placed between two discs or cones on the axle bush as shown in the accompanying diagram, adhesive being used for attaching the latter to the rubber.



Indiarubber balls as the basis of normal and (right) “doughnut” wheels

By suitably proportioning the diameter of the discs or cones in relation to the diameter of the ball, any type of wheel from normal to “doughnut” pattern can be produced. The discs may be made from thin card, plywood, balsa or metal, and axle bushes from rolled paper thin reed, or metal tube.

If air leakage on landing is excessive, says Mr. Beilschmidt, it may be prevented by sealing the tyre, which can be done by drawing a piece of cycle valve tubing over the axle bush and making fillets of rubber cement.

### THAT “AUTOMATIC PILOT”

A READER has written commenting on the “automatic pilot” for model aeroplanes which, as we described last month, has been suggested by an enthusiast in British North Borneo. The gadget, it may be remembered, consisted essentially of a disc which, placed in the airstream, pulled on the elevator controls against the tension of a spring and caused the nose of the machine to rise as the speed increased.

The reader remarks that in his experience such a fitting would only tend to exaggerate the difficulty which so many model builders experience, i.e., that of the model climbing steeply under the initial thrust of the airscrew on launching.

As we said at the time, most similar brain-waves which we have seen have proved unsuccessful, but our overseas reader was so positive about the success of his idea that we considered it worth passing on, if only as a topic for discussion.



Two flying scale models from Mr. L. S. Wigdor's big fleet. Above is a Hawker “High-speed Fury,” which even has the scale number of fuselage stringers and wing ribs, and on the left is a Curtiss F.9.C.2 Macon fighter (the type carried by the ill-fated U.S. airship) of 19½ in. span and weighing 2.2 oz.

### CLUB ACTIVITY

ACTIVITY among the model aeroplane clubs is now approaching its zenith, and a number of reports are to hand concerning outdoor activities.

A meeting which hundreds of enthusiasts in London and the Home Counties are eagerly awaiting is the Northern Heights Club's Gala Day, which takes place in just over a fortnight's time, i.e., on Sunday, June 30. As already announced in *Flight*, the venue is Fairey's aerodrome at Heathrow, which lies a little way to the west of the Great West Road extension, between the Bath and Staines roads. All who are interested in model aeronautics will be welcome, and there will be no admission fee. One of the most interesting items will be a flying scale model contest in which the first prize is the *Flight* Trophy illustrated at the foot of this page. Anyone may enter for this competition, and need not be a member of a club; the models will first be judged for faithfulness to the original, and will afterwards be required to make three flights, the best total duration counting. No flights of less than five seconds will count. The entrance fee is 6d.

The programme begins at 11.30 a.m., and full details may be obtained from Mr. C. A. Rippon, 70, Hampden Way, London, N.14.

Among recent events was the first T.M.A.C. Rally of the season, which took place at Wormwood Scrubbs. Mr. W. Worden won the Inter-Group competition (heavyweight section), thus giving the Group III a big lead, and Mr. A. A. Judge was the winner of the take-off contest.

In spite of a high wind some excellent flying was seen in the Gamage Cup Contest, held at Wimbledon on May 12. Practically every competitor flew a balsa model built to the popular tapered one piece high-wing formula. The winner was Mr. G. Mogford, with an average of 78.2 sec.

Held at Sywell by arrangement with the Northamptonshire Aero Club, the Midlands Rally of Model Aero Clubs aroused a great deal of interest. The winner in the rubber-driven models section was Mr. A. E. Morrod, who also made best performance in the power class “Gull.” Mr. J. B. Allman won the duration contest with a figure of 3 min. 30 sec., and the altitude competition was won by Mr. Morrod.



The *Flight* Trophy, First prize in the scale model contest at the Northern Heights Rally on June 30



# THE INDUSTRY

## BRITISH SALMSON ENTERPRISE

It is rumoured that British Salmson Aero Engines, Ltd., are to turn out a new range of civil and military engines from 40 h.p. to 900 h.p., and that a share issue will shortly be made.

## ADVICE TO PATENTEES

Those seeking information on the subject of patents and trade marks will find much practical advice in a booklet on this subject which is obtainable free from Kings Patent Agency, Ltd., Wardrobe Chambers, 146a, Queen Victoria Street, London, E.C.4.

## BOSTIK AT THE B.I.F.

Among other examples on their stand at the B.I.F. the Boston Blacking Co., of Leicester, exhibited the uses of Bostik adhesives as a waterproof and draughtproof method of fixing glass in windcreens.

## VACUUM OIL IN THE I.F.S.

The formation has just been announced of the Vacuum Oil Company (Ireland), Ltd., Mr. C. G. Reeves has been appointed director and manager of the new Company, which will be sole marketers of Mobiloil and Gargoyle oils and greases in the Irish Free State.

## NON-INSULATING TYRES

One drawback to the increasing use of tail-wheels on aircraft has been the fact that the machine thereby becomes very completely insulated, electrically, from the ground. Thus there is danger of static electricity causing fire during refuelling.

The Dunlop Rubber Company has found a way out of the difficulty by discovering and perfecting a new type of rubber compound which, when used in tyres, gives electrical conductivity without, it is claimed, materially altering any of the characteristics of the tyre such as wear, flexibility, appearance or durability.

These tyres are now being marketed under the name of "Ecta" ("Electrically Conducting Tyres for Aircraft").

The electrical resistance of these tyres is about one-tenth-millionth of the resistance of a similar tyre of standard construction, and the time required to conduct the static charge to earth in the case of the largest aeroplanes is of the order of one-thousandth part of a second, whereas a normal tyre would require over two hours.

As the tyres, hub and bearing now become part of a conducting system, it is necessary that the hub shall be in electrical contact with the main earthing strip of the aeroplane, and that the beads of the tyre shall be in contact with the metal of the hub. This object can be attained satisfactorily by spraying the inside of the rim with metal, after removing the layer of protective dope.

The rubber may be used for many purposes where normal non-conducting rubber is used if some degree of electrical conductivity would be an advantage.

## PUBLICATIONS RECEIVED

*Aeronautical Research Committee Reports and Memoranda, No. 1629: Accelerations of Aeroplanes in Vertical Air Currents, Part II.* By H. R. Fisher. January, 1934. Price 1s. net, H.M. Stationery Office, London, W.C.2.

*Bulletin du Service Technique de L'Aéronautique: Résultats d'essais au tunnel* Chaussée de Waterloo, 72, A Rhode-Saint-Genève, Bruxelles, Belgium. *Glasgow University Engineering Society Year-Book*, January, 1935. James Watt Laboratories, The University, Glasgow, W.2.

*The Germ Triangle*—No. 7 issue of a periodical devoted to Germ Oil developments. *Henrietta*, by Charles Lorne. Price 7s. 6d. net, Peter Davies Ltd., 30, Henrietta Street, London, W.C.2.

*A Report on Civil Aviation*, by R. L. Nunn; Acting Director of Public Works, Straits Settlements.

*The Problem of the Air* (Report on League of Nations Union Conference on April 3 and 4); 6d. League of Nations Union, 15, Grosvenor Crescent, London, S.W.1.

*Report of the Institute of Aeronautical Research, Warsaw.* Rakowiecka 2B, Warsaw, Poland.

*Our Future in the Air*, by Brigadier General P. R. C. Groves. Price 2s. 6d. net, George Harrap & Co., Ltd., 182, High Holborn, London, W.C.1.

*My Thirty Years of Speed*, by Sir Malcolm Campbell. Price 10s. 6d. net, Hutchinson & Co., 34, Paternoster Row, London, E.C.4.

*Aeronautical Research Committee Reports and Memoranda: No. 1619: Torsion of a Rectangular Tube with Axial Constraints*, by D. Williams. May, 1934. Price 1s. 6d. net. No. 1622: Flow in the Boundary Layer of Streamline Bodies, by H. M. Lyon. May, 1934. Price 3s. net. No. 1625: Direct Calibration of Compensated Hot-Wire Recording Anemometer, by C. Salter and W. G. Raymer. March, 1934. Price 9d. net. No. 1573: On the Calculation of Stresses in Braced Frameworks, by R. V. Southwell and J. B. B. Owen. July, 1933. Price 4s. net. H.M. Stationery Office, London, W.C.2.

*National Physical Laboratory Report for the Year 1934.* Price 13s. net. H.M. Stationery Office, London, W.C.2.

*Catalogues of Books on over 450 Technical Subjects and Applied Science*; W. and G. Foyle, Ltd., 119-125, Charing Cross Road, London, W.C.2.

*Industrial Electric Motors.* An electrical engineers' pocket reference book (80 pages), obtainable from Higgs Motors Ltd., Witton, Birmingham 6.

*Bulletin du Service Technique de L'Aéronautique: Vibrations couplées des ailes d'avion.* April, 1935. Chaussée de Waterloo. A Rhode-Saint-Genève (Bruxelles).

*Who's Who in British Aviation*, 1935. Price 6s. Bunhill Publications Ltd., 112, Bunhill Row, London, E.C.1.

*Model Aircraft for Boys*, by W. Rigby. Price 1s., Oxford University Press, Amen House, Warwick Square, London, E.C.4.

*Force*, by Lord Davies. Price 3s. 6d., Constable & Co., 10-12, Orange Street, London, W.C.2.

## NEW COMPANIES

**BRITISH INTERNATIONAL AIRCRAFT DISTRIBUTING COMPANY.** Private Company, registered May 17. Capital: £2,000 in 1,000 redeemable 6 per cent. cumulative preference shares of £1 and 4,000 ordinary shares of 5s. Objects: To carry on the business of constructors, etc. of aircraft of all kinds. First directors to be appointed by subscribers. Solicitors: Kenneth Brown Baker, Essex House, Essex Street, London, W.C.2.

**BRIAN ALLEN AVIATION LTD.** Private company, registered May 27. Capital: £5,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in all kinds of aircraft, motor cars and accessories. Directors: Brian S. Allen, Cecil H. Gaskin. Registered office: 4, Bloomsbury Place, London, W.C.1.

**AIRPORTS, LTD.** was registered as a "public" company on May 30 with a nominal capital of £275,000 in 5s. shares. The objects are to adopt an agreement with Airports, Ltd. (in voluntary liquidation) and J. Diamond; to develop and turn to account the property and assets comprised therein, and to carry on the business of operators of airports, etc., and manufacturers of and dealers in aircraft, etc. The following have consented to be directors:—The Rt. Hon. Viscount Goschen, G.C.S.I., G.C.I.E., G.B.E.; Air Marshal Sir John F. A. Higgins, K.C.B., K.B.E., D.S.O., A.F.C.; Sir Felix J. C. Pole; Sir Samuel H. Wilson, G.C.M.G., K.C.B., K.B.E.; Alfred C. M. Jackman, A.M.I.Ae.E.; Andre M. Desoutter.

**SOUTH STAFFORDSHIRE AERO CO., LTD.** Private company; capital, £2,000 in £1 shares. Objects: To enter into (a) an agreement with S. N. Jones, and (b) a lease with the Borough of Walsall, and to carry on the business of pleasure flying, aerial transport, etc. Directors: Sidney N. Jones, The Porchway, Gorway Road, Walsall; William J. Minors.

**BOLNEY AIRPORTS, LTD.** Private company; nominal capital, £10,010 in £1 shares. Objects: to carry on the business of aerial and other transport. Directors: Arthur I. C. Turner, 43, Regency Square, Brighton; Mrs. Evelyn G. Fraser.

**ALP AIR LINE, LTD.** public company; nominal capital, £20,000 in 19,000 ordinary shares of £1 each and 20,000 deferred ordinary shares of 1s. each. Objects: to operate air services, etc., in any part of the world. Directors: Baron Grimthorpe, Easthorpe Hall, Malton (chairman of Airspeed (1934) Ltd.); Robert H. S. F. de Vere Somerset (managing director, North Eastern Airways, Ltd.); Frederic C. R. Jaques (general manager of North Eastern Airways, Ltd.); John Vieller; Jean Galley.

## INCREASE OF CAPITAL

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## AERONAUTICAL PATENT SPECIFICATION

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in parentheses are those under which the specification will be printed and abridged, etc.)

(Published May 23, 1935.)

29473. BROWN, J. P.: Gyroscopic apparatus for air and other craft. (427,422.)

35053. ARMSTRONG SIDDELEY MOTORS, LTD., and REYNOLDS, R.: Cowling for aircraft engines. (427,343.)

14837. BRISTOL AEROPOLANE CO., LTD., and FEDDEN, A. H. R.: Cooling arrangements for the cylinders of aircraft internal combustion engines. (427,510.)

(Published May 30, 1935.)

30252. BRISTOL AEROPOLANE CO., LTD., and FEDDEN, A. H. R.: Valve gear for multi-cylinder internal-combustion engines. (427,808.)

36033. DUNLOP RUBBER CO. LTD., GOODYEAR, E. F., WRIGHT, J. and TREVASKIS, H.: Brakes. (427,829.)

21316. KIDDE & Co., Inc., W.: Methods of producing metal containers for fluids. (427,854.)

(Published June 6, 1935.)

27703. AUGE, H.: Toy aeroplanes (428,053.)

31234. A.T.S. CO. LTD., and WYLIE, H. N.: Metal framework for aircraft (428,225.)

31300. COATS, A. G. and HAFNER, R.: Rotative-wing aircraft (428,231.)

31318. GILBERT, W. V.: Process and means for shaping plates into hollowed

objects, such as boat hulls, wings for aircraft, sidecars, and the like (428,200.)

31602. MULLER, W.: Parachutes (428,389.)

22337. SPERRY GYROSCOPE CO., Inc.: Control devices for use in a system for

supplying air to air-driven instruments (428,426.)

24248. MESSERSCHMITT, W.: Cantilever type of landing gear for flying machines

(428,265.)

(Published June 13, 1935.)

31377. HENDERSON, Sir J. B.: Automatic control of the steering of ships, air-

craft, and the like (428,533.)

31867. HAWKER AIRCRAFT, LTD., and CAMM, S.: Retractable undercarriages

(428,539.)

5352. LOW, A. M.: Ground apparatus for facilitating the landing of aircraft

(428,716.)

14908. QUILTER, R. C.: Parachute harness (428,566.)



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A. P. THURSTON & CO., Chartered Patent Agents, 329, High Holborn, W.C.1. Tel.: Hol. 1117.

GEE & CO. Patents and Trade Marks throughout the World. (H.T.P. Gee, Mem. R.S.G.B., A.M.I.R.E., etc.), 51-52, Chancery Lane, London, W.C.2 (2 doors from Govt. Patent Office). 'Phone: Holborn 1525. Handbook free.

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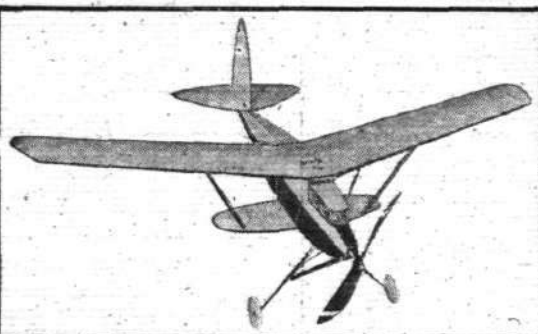
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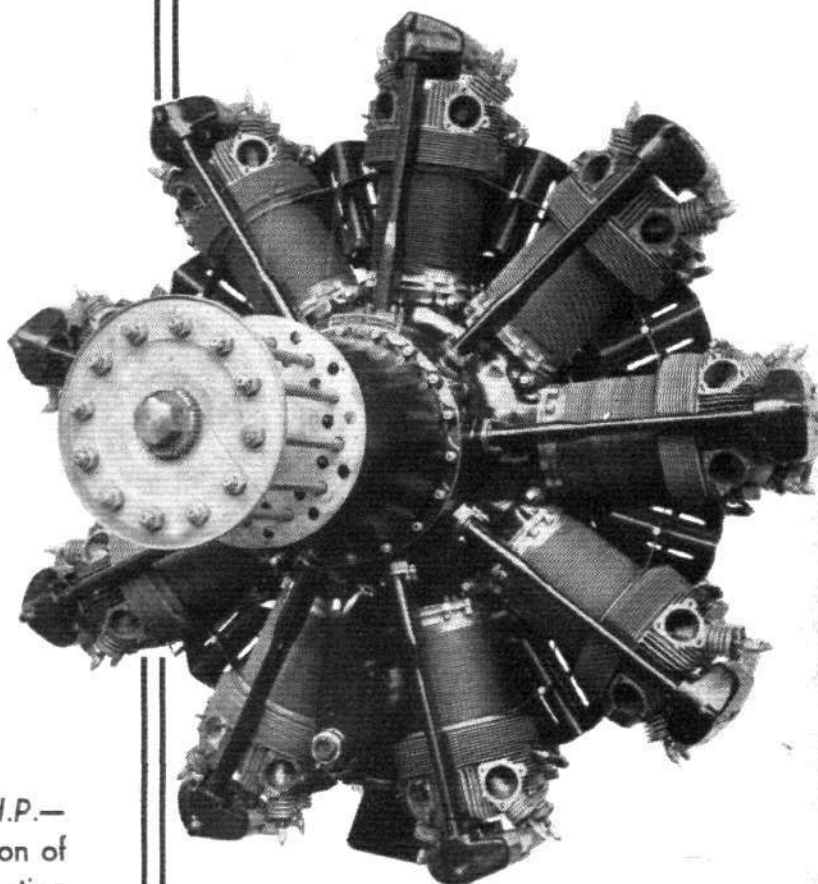
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